PIT AND QUARRY

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PERIODICAL DIVISION

DECEMBER, 1939

War Demand Accelerates Fluorspar Production . . . What the University of Wisconsin's Tests on Concrete Blocks Reveal . . . Longest Belt-Conveying System Being Fabricated

RUBBER OUTWEARS STEEL 4 to 1

in gravel chutes

YOU CAN DO IT BETTER WITH GOODYEAR RUBBER

PLACE: A large Pennsylvania sand and gravel plant.

PROBLEM: Too rapid wear of steel chutes used to carry sand and gravel up to 2½" size from screens to storage bins.

SOLUTION: When lined with ½" Goodyear rubber chute lining on specification by the G.T.M.—Goodyear Technical Man—*four times longer* service was obtained than from unlined chutes of high-grade ⅝" steel!

REASON: Goodyear chute lining is an extremely tough rubber sheet material specially developed by Goodyear for protection of all surfaces exposed to constant abrasion. Its resiliency enables it to withstand pounding wear far longer than rigid metals.

CONCLUSION: On any operation where abrasion is a problem—conveyor belts, air hose, chutes — let the G.T.M. show you how *you can do it better with Goodyear rubber!* To bring him to your plant write Goodyear, Akron, Ohio, or Los Angeles, California—or phone the nearest Goodyear Mechanical Rubber Goods Distributor.

THE GREATEST NAME IN RUBBER

GOODYEAR

Centennial of Charles Goodyear's discovery of vulcanization

Sand Classification

AT LOWEST COST CALLS FOR THE RIGHT EQUIPMENT

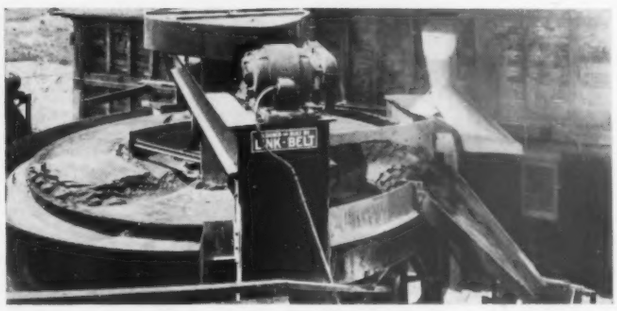
● Link-Belt offers five types of settling and dewatering devices to meet varying conditions found in different pits. These units, described on this page, have been developed and used in many applications to give the required grading, cleansing or dewatering to meet local specifications. Send for special literature.

LINK-BELT COMPANY Chicago Philadelphia Indianapolis Atlanta
San Francisco Toronto Offices in Principal Cities 7889

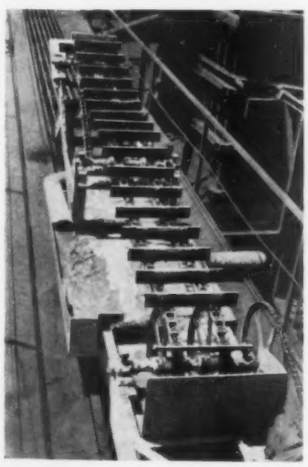
Power Operated Units Produce a DRYER Sand

Many washing plants, particularly those loading trucks, require a sand with a smaller percentage of water than can be obtained with any type of settler having automatic sand discharging mechanism. To meet this need, Link-Belt manufactures the 3 kinds of power operated dewatering devices as shown here.

The Rotoscoop



This unit fills the need for a sand dewatering device that will catch the available sand grains of sufficient fineness to meet present day specifications, and deliver the product dry enough to permit truck transportation, or conveying to and from storage by belt conveyors. It is made in four sizes, 15′, 12′, 9′ and 6′ diameters. It consists of a large circular steel tank, together with a rotating disk carrying inclined scoops. Capacities varying from 25 to 150 tons per hour, can be lifted from the large settling area, with the water largely displaced from the voids through a squeezing action peculiar to this device. Because the inlet and discharge are on about the same level, little head room is required. It is entirely self-contained, with motor and driving machinery. A unique feature is that the entire area of the tank is submerged, and utilized for settling purposes. The slow motion of the scoop does not hinder good settling.



Dewatering Flight Conveyor

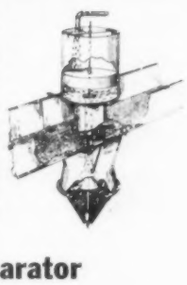
The stream of sand and water is fed into the tank near the center. The settling sand is slowly dragged, by the flights, out of the water, up an incline of proper length, and at a proper speed, to give the drainage required. The dirt and water flow out at the end of the tank opposite the sand discharge. The tank can be made of either steel or wood. By using a fine sand launder and two Dewatering Flight Conveyors, or by arranging two Dewatering Flight Conveyors in series, a coarse and a fine sand can be produced.

Dewatering Screw Conveyor

The screw has a scrubbing action on the sand, and keeps the loam and other foreign matter in suspension, to be carried away in the overflow. Thus a clean and dry sand is secured for use where specifications and inspection are rigid. Also, the screw can be regulated either to reclaim the fine sand, or allow it to pass out at the overflow. By using two units in series, the coarser sands can be reclaimed for concrete sand, and the finer for plaster sand.

Accurate Grading with the SHAW Classifier

This unit will not only produce clean commercial sand but will also make such special grades as asphalt, filter, engine, gypsum and glass sands. It employs a combination of surface current and rising current classification. By using in series, two or more grades of sand can be made at the same time, or mixed into any combination desired. Not only can the sand be graded, but leaves, dirt, etc., can be removed. The dirty wash water is replaced by clean water, so that the small quantity of water which does go with the sand, carries no dirt or silt. Sand graded and cleaned by this unit will meet the most exacting specifications, particularly where removal of fines is important.



Automatic Conical Separator

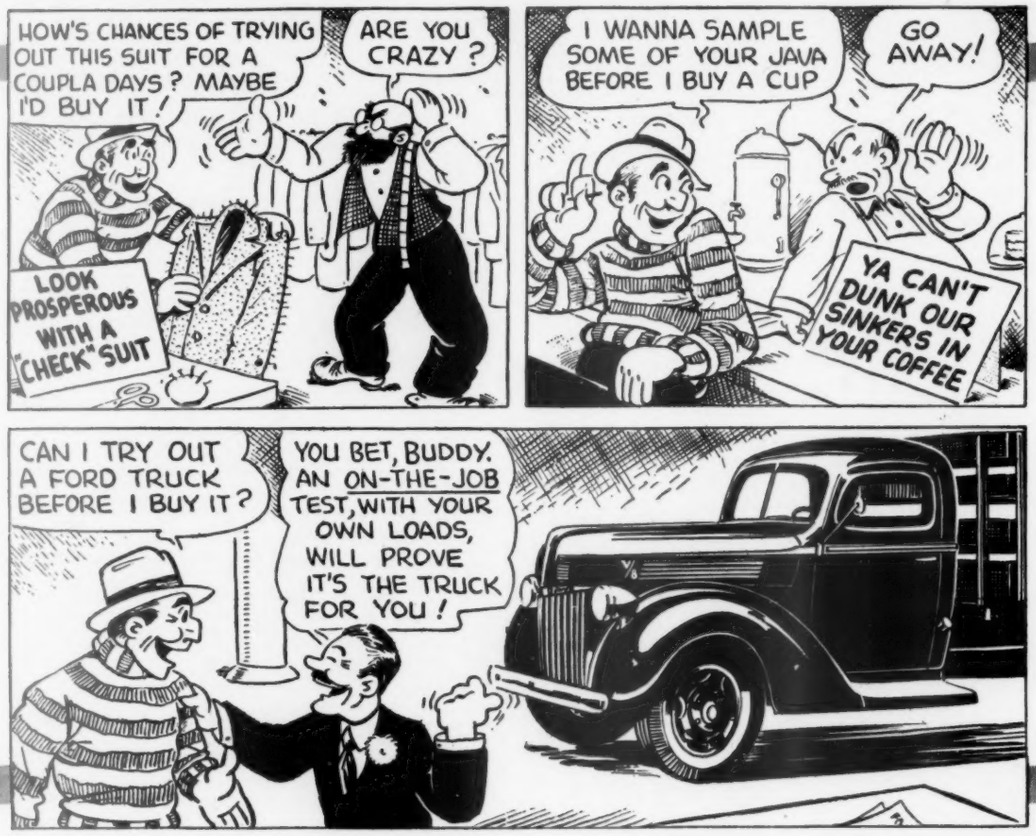
This less expensive device meets satisfactorily all the requirements in the degree of separation called for by many local specifications. It is reliable—has been proved by satisfactory separation for 23 years or more in many plants throughout the country. Soil water and scoured sand from the screens are delivered into the conical body of the separator. The sand settles to the bottom and gradually accumulates, while the water overflows and runs continuously out of the spill-way, carrying away with it the impurities in suspension. Made in 3 sizes, in capacities up to 2000 gallons of water per minute.

LINK-BELT
· HANDLING ·
PREPARATION
EQUIPMENT

PIT AND QUARRY, December, 1939. Vol. 32, No. 6. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago, Ill. Subscription price $1 for 1 year in the U. S. and possessions, Canada, Central and South America; elsewhere $1 additional for each year. Single copies 20 cents. Entered as second-class matter February 28, 1932, at the Post Office at Chicago, Ill., under the act of March 3, 1897.

"TERRIBLE TERRY" the Truck Driver

TERRY TRIES BEFORE HE BUYS


HOW'S CHANCES OF TRYING OUT THIS SUIT FOR A COUPLA DAYS? MAYBE I'D BUY IT!
ARE YOU CRAZY?
LOOK PROSPEROUS WITH A "CHECK" SUIT
I WANNA SAMPLE SOME OF YOUR JAVA BEFORE I BUY A CUP
GO AWAY!
YA CAN'T DUNK OUR SINKERS IN YOUR COFFEE
CAN I TRY OUT A FORD TRUCK BEFORE I BUY IT?
YOU BET, BUDDY. AN ON-THE-JOB TEST, WITH YOUR OWN LOADS, WILL PROVE IT'S THE TRUCK FOR YOU!

MAKE AN "ON-THE-JOB" TEST TODAY!

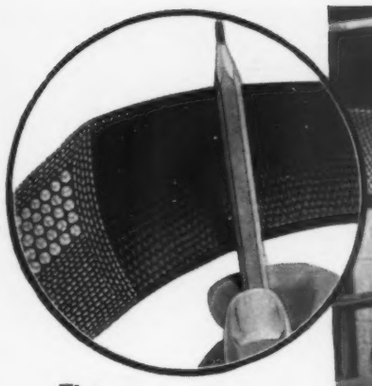
Ask any Ford dealer how you can arrange for a free demonstration — an actual "on-the-job" test designed to give you the *facts* on Ford performance and economy before you buy!

Before You Buy Any Truck or Commercial Car—
See the Ford Line for 1940!

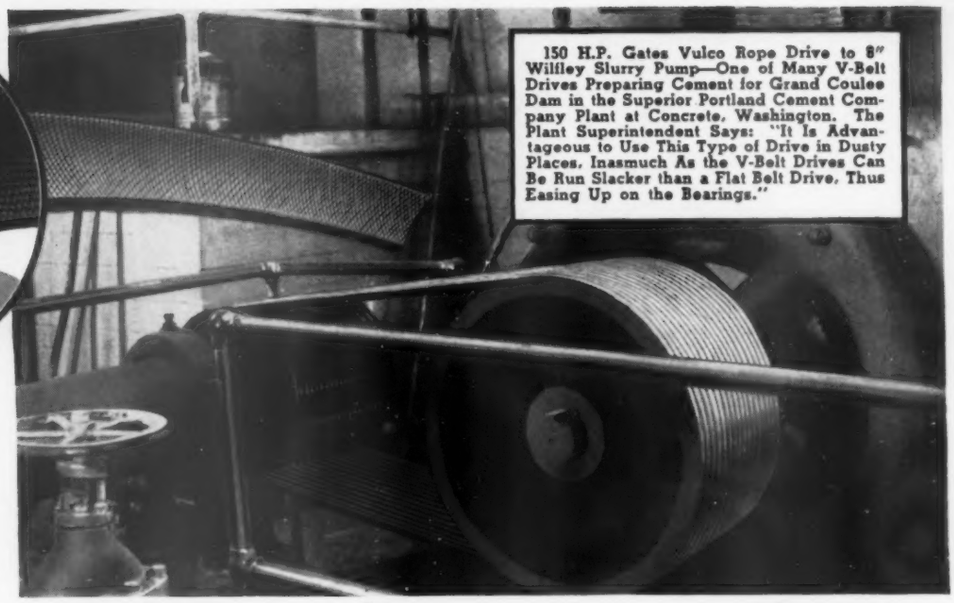
3 Engine Sizes — 95, 85, 60 hp ★ 6 Wheelbases ★ 42 Body and Chassis Types New Modern Styling ★ New Simplified Chassis Design ★ New Longitudinal Front Springs ★ Increased Engine Accessibility ★ Stronger Cab Construction ★ Increased Driver Comfort ★ New Sealed-Beam Headlamps ★ New Instrument Panels — *and a host of other new and time-proved features that make Ford Trucks and Commercial Cars for 1940 more than ever the outstanding units for the money!*

FORD TRUCKS AND COMMERCIAL CARS

Ford Motor Company, builders of Ford V-8 and Mercury Cars, Ford Trucks, Commercial Cars, Station Wagons, Transit Buses.



The **Concave Side** IS A GATES PATENT



150 H.P. Gates Vulco Rope Drive to 8" Wilfley Slurry Pump—One of Many V-Belt Drives Preparing Cement for Grand Coulee Dam in the Superior Portland Cement Company Plant at Concrete, Washington. The Plant Superintendent Says: "It Is Advantageous to Use This Type of Drive in Dusty Places, Inasmuch As the V-Belt Drives Can Be Run Slacker than a Flat Belt Drive, Thus Easing Up on the Bearings."

Prove this *Yourself!*

Grip a Bending V-Belt With Your Fingers and Learn ***WHY*** the Concave Side Makes

A BIG SAVING in Belts and Power

What Happens When a V-Belt Bends

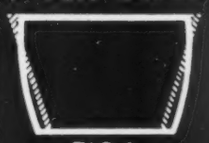


FIG. 1

FIG. 2

If you want longer belt wear and better transmission of power, make this simple test:

Take any V-belt that has *straight* sides. Bend that V-belt while you grip its sidewalls between your fingers and your thumb. You will *feel* the sides of the belt *bulge out*—as shown in figure 1 on the left. Clearly, that out-bulge gives the belt a shape that does not fit its sheave groove.

Now look at figure 2. There you see what happens when you bend a belt that is built with the patented *concave* side. You get a similar change in sidewall shape — but what a *different result!* The precisely engineered concave side becomes perfectly *straight*. This belt, when bent, exactly fits its sheave groove —and two big savings result.

First:—With no out-bulge of the sides, the *full width* of the belt *uniformly* grips the sheave groove wall. This means *uniform* wear—*longer life*. Second:—The full side-width grip on the pulley carries heavier loads without slippage. This saves belt wear—and it saves a lot of power, too!

The Gates Vulco Rope is the Only V-belt built with the patented concave side.

THE GATES RUBBER COMPANY

Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

CHICAGO, ILL., 1524 South Western Ave. HOBOKEN, N. J., Terminal Building BIRMINGHAM, ALA., 1631 1st Ave., S. LOS ANGELES, CAL., 741 Warehouse St.

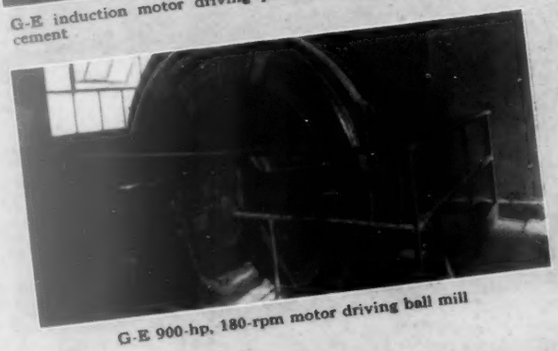
DENVER, COLO., 999 South Broadway DALLAS, TEX., 2213 Griffin Street PORTLAND, ORE., 1231 N. W. Hoyt St. SAN FRANCISCO, CAL., 2700 16th St.

LOW REPAIR COSTS ON Less than 3¢ per Hp per Year—

Notes on our trip to the Blue Diamond Plant

G-E induction motor driving pump for transferring finished cement

G-E motor driving separator. Coarse cement, separated from fines, is returned to the ball mill



G-E 900-hp, 180-rpm motor driving ball mill

G-E control for sacking house. Note both the magnetic and drum controls

HERE'S another example of how G-E equipment helps to assure continuous, low-cost electrical operation in the production of cement by modern, up-to-date methods. It's the plant of the Blue Diamond Cement Company, Los Angeles, California—G-E equipped throughout, with 1250 horsepower of motors and co-ordinated control to match.

Total electrical repair costs at this plant—for both motors and control—have averaged less than 3 cents per horsepower per year for the ten years that the plant has been in operation. That's *real* dependability, as you will agree—knowing, as you do, the exacting requirements of cement production and the need for equipment that will stand up on heavy-duty jobs 24 hours a day for months at a stretch.

Just as the dependability of G-E equipment and the assistance of G-E application engineers have helped Blue Diamond and many other companies that are producing high-grade cement at low cost, so they can help you to make the most of the opportunity presented by current construction projects. In planning your cost reduction program, remember that our engineers will be glad to help you with the electrical requirements. To enlist their co-operation, just get in touch with our nearest representative. General Electric, Schenectady, N. Y.

MOTORS AND CONTROL*—

THAT'S WHAT THE TRIP TO BLUE DIAMOND CEMENT COMPANY'S 100% G-E EQUIPPED PLANT SHOWS

General view of the Blue Diamond Cement Company's plant

G-E wound-rotor motor driving cement conveyor that brings cement from silos to sacking house

G-E motors driving sackers

G-E motor driving the cooler which reduces temperature of cement before going to silos

* **A Statement from W. G. BRADLEY,**
Vice-president, BLUE DIAMOND CORPORATION

"Ten years of heavy service have proved the dependability of the General Electric motors and control with which our plant is completely equipped. During this period repair costs on the 1250 horsepower of motors and their controls have been less than $350."

W. G. Bradley, Vice President

GENERAL ELECTRIC

011-520

PRIMACORD·BICKFORD DETONATING FUSE for Large and Small Blasting

It is often practicable to use Primacord-Bickford Detonating Fuse in comparatively small blasts, especially in connecting Jackhammer holes. The ease of making each hook-up, and the fact that Primacord is insensitive to ordinary shock, has greatly increased the use of this method in the shooting of shallow holes.

For the giant blast, Primacord offers new advantages: a faster and more powerful detonating wave; lighter weight; easier handling and use; lower costs.

Send for the Primacord booklet. It suggests new ways to better output and profit in blasting.

THE ENSIGN-BICKFORD COMPANY
SIMSBURY, CONNECTICUT, U. S. A.

Makers of Cordeau-Bickford Detonating Fuse and Safety Fuse Since 1836

PRIMACORD·BICKFORD *Detonating Fuse*

PB 15

it's for you Mr. Operator—

a new MULTI-STAGE FINE REDUCTION CRUSHER

- ★ MULTI-STAGE BELL HEAD AND CURVED CONCAVES
- ★ QUICK AND EASY ADJUSTMENT
- ★ SHOCK ABSORBER SUSPENSION
- ★ ABSOLUTE DUST PROTECTION
- ★ AUTOMATIC LUBRICATION
- ★ ROLLER-BEARING COUNTER-SHAFT

TRAYLOR-STEARNS PATENTS

CRUSHES FINER AT GREATER CAPACITY WITH LESS POWER

PRODUCT IS CUBICAL-NO SLABS, MINIMUM OVERSIZE

POSITIVELY NON-CHOKABLE

WRITE FOR BULLETIN 113

SEE IT AT THE ST. LOUIS EXPOSITIONS, JAN. 17-19 & 22-24, 1940

PROOF POSITIVE!

The photo shows two samples of crushed trap rock, taken WITHOUT SELECTION from outflowing streams of finished output. To the left is the product of a 4'0" reduction crusher, (not a Traylor), extensively used, and at right that of a 3'0" TRAYLOR-STEARNS MULTI-STAGE FINE REDUCTION CRUSHER. Both crushers had a feed of THRU 1⅞" ON ⅞", a very slabby product of a secondary crusher. Both crushers were set to 5/16" closed side of discharge. The TRAYLOR-STEARNS had an output of 60 tons per hour and the "other" crusher 45 tons per hour. The TRAYLOR-STEARNS product contained 42.2% THRU ⅜", square holes, while the "other" crusher product contained 24.3% THRU ⅜", square holes. The TRAYLOR-STEARNS used one H.P. per ton of product and the "other" crusher one and one-third H.P. per ton of product.

TRAYLOR ENGINEERING & MANUFACTURING CO.

ALLENTOWN, PENNA. U.S.A.

WORLD WIDE EXPERIENCE

built into RED ARCH

Stiff back, cast steel, sheave frame holds entire unit rigid and incorporates oil pocket for sheave-hub lubrication.

New two-piece drag-bail socket eliminates multiple wearing parts and gives more accurate control.

Reversible, snag proof, drag-chain clevises that provide two locations for drag hitch.

Famous inserted BECO Tiger Teeth easily reversed, resharpened and renewed. The manganese steel lip has sides extending forward for attachment of clevis hitch plates to provide a direct drag pull on the lip and not through the bucket body.

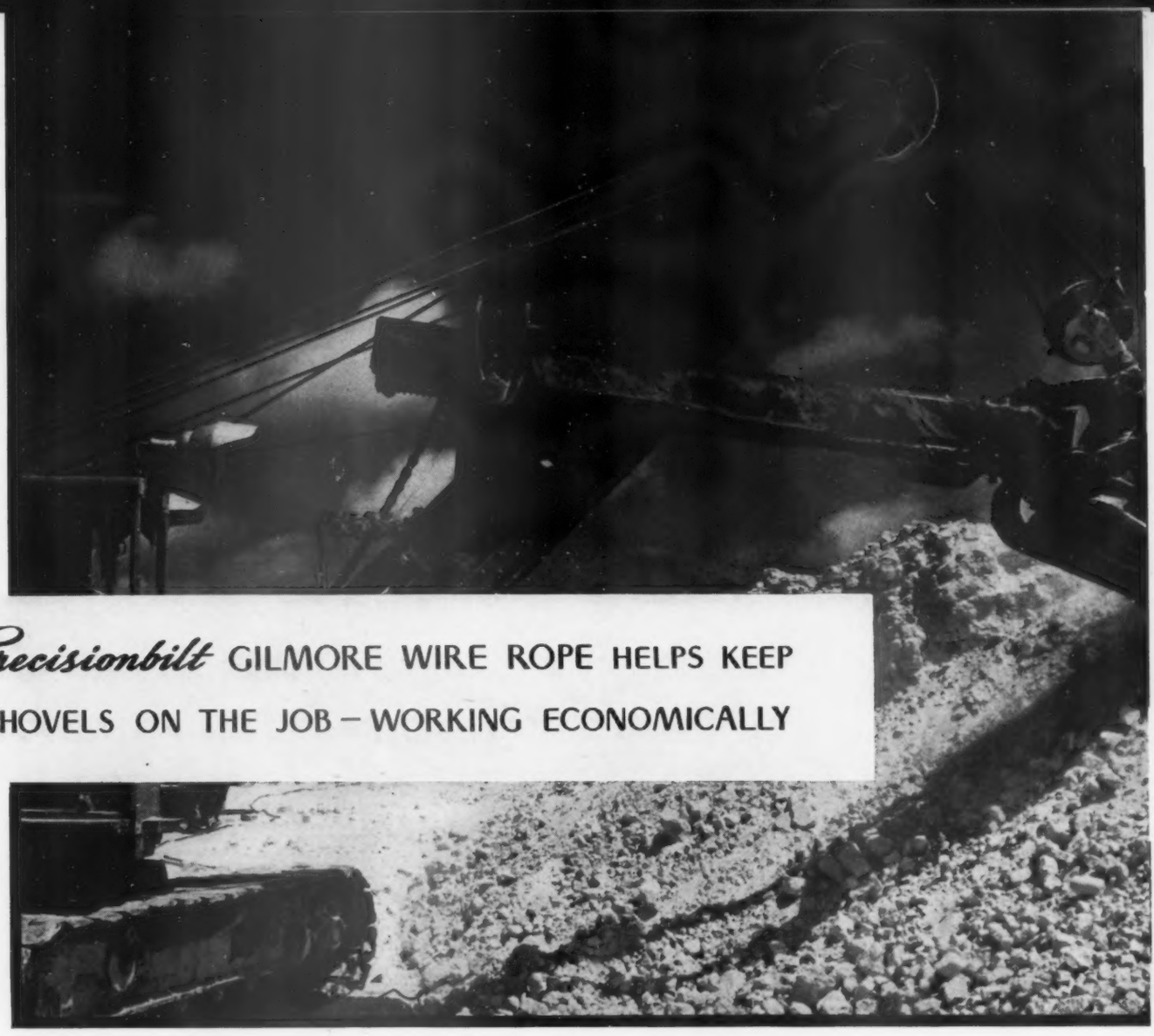
New Red Arch incandescent butt-welded chain has twice the strength and wearability of ordinary chain.

BUCYRUS ERIE

R5

Bucyrus·Erie

SOUTH MILWAUKEE, WISCONSIN



J&L *Precisionbilt* GILMORE WIRE ROPE HELPS KEEP YOUR SHOVELS ON THE JOB – WORKING ECONOMICALLY

J&L Gilmore Wire Rope assures economical and efficient digging and loading operations — because it has the strength, flexibility and abrasion-resistance to stand up under long, continuous service.

Made of J&L Controlled Quality Steel on the world's newest wire rope making machines — which work to a tolerance of 1/1000 of an inch — Precisionbilt wire rope has toughness and uniformity which account for its long life and wear-resisting qualities.

Every strand is perfectly lubricated by a new scientific process.

When you are making wire rope replacements on your shovels, buckets and drags, or when you order new equipment, specify J&L Precisionbilt. Write today for our wire rope catalog.

J&L—PILOTS THE COURSE OF CONTROLLED QUALITY IN STEEL

JONES & LAUGHLIN STEEL CORPORATION
AMERICAN IRON AND STEEL WORKS

GILMORE WIRE ROPE DIVISION
PITTSBURGH, PENNSYLVANIA

J&L STEEL

J & L — PARTNER IN PROGRESS TO AMERICAN INDUSTRY

PIT AND QUARRY'S 1940 GIANT JANUARY ISSUE

Largest Net Paid Producer Circulation in the Industry

Closing Date December 22

RUSH Your Ad for Good Position

The early advertiser gets the choice space—so send your reservation at once, and let your copy come later.

Page rate $155.00 on annual contract.

Special Supplement Section on India Stock, $10.00 extra—puts your ad in a special forward position.

START YOUR 1940 CAMPAIGN with an advertisement in January PIT AND QUARRY—the best buy of the year.

COMPLETE COVERAGE

Every plant, every producer, every buying factor in the cement, crushed stone, sand and gravel, lime, gypsum and allied industries, will receive a copy of January PIT AND QUARRY—giving 100% coverage in the field.

CONVENTION DISTRIBUTION

January PIT AND QUARRY, in addition to its regular circulation, will be distributed to the attendants of the conventions of the crushed stone, sand and gravel, ready-mixed concrete producers, and Road Show—when equipment purchasers are in a buying mood.

ANNUAL REVIEW NUMBER

January PIT AND QUARRY will contain a complete résumé of the past year's developments in methods, machines and materials—a wealth of valuable data for producers, engineers and purchasing agents.

NEW EQUIPMENT SECTION

A large section of January PIT AND QUARRY will be devoted to descriptions and illustrations of new equipment—a parade of mechanical progress—up-to-date information that every progressive operator will want to have.

This giant issue will be a reference number from cover to cover—a Yearbook with an "advertising life" far longer than that of any other issue—an advertising opportunity which you can not afford to miss.

PIT AND QUARRY 907 Rand McNally Bldg., CHICAGO

SLOW DOWN ROPE WEAR!

A wire rope that reduces rope wear to a minimum—that provides maximum resistance against fatigue—Roebling "Blue Center" assures maximum rope operating economy. It is the highest achievement of Roebling's over 90 years of rope making experience! Ask about this rope—either standard or preformed.

JOHN A. ROEBLING'S SONS COMPANY, TRENTON, N.J.
BRANCHES IN PRINCIPAL CITIES

STRONGER—Wire of highest strength consistent with ductility and toughness

TOUGHER—Provides maximum resistance against wear, sudden shocks, vibration

SAFER—Unequalled for uniformity of quality

SAVING—Insures lowest general average operating cost

For real service on *Wire Rope*

get in touch with your Bethlehem distributor

YOU'LL find the distributor for Bethlehem Wire Rope is a good man to know and have dealings with. You'll find that he knows his business thoroughly and that he is well able to suggest the best Bethlehem Wire Rope for your particular type of work.

You'll find, too, that your distributor's stock of Bethlehem Wire Rope is large and that he is backed to the limit in keeping it up-to-date by both the Bethlehem district warehouse and by the rope mill itself.

To be sure of prompt, efficient service on wire rope and of getting the grade and type that exactly meets your needs, get to know the nearest distributor for Bethlehem Wire Rope. A letter to Bethlehem Steel Company, Bethlehem, Pa., will bring you his name and address by return mail.

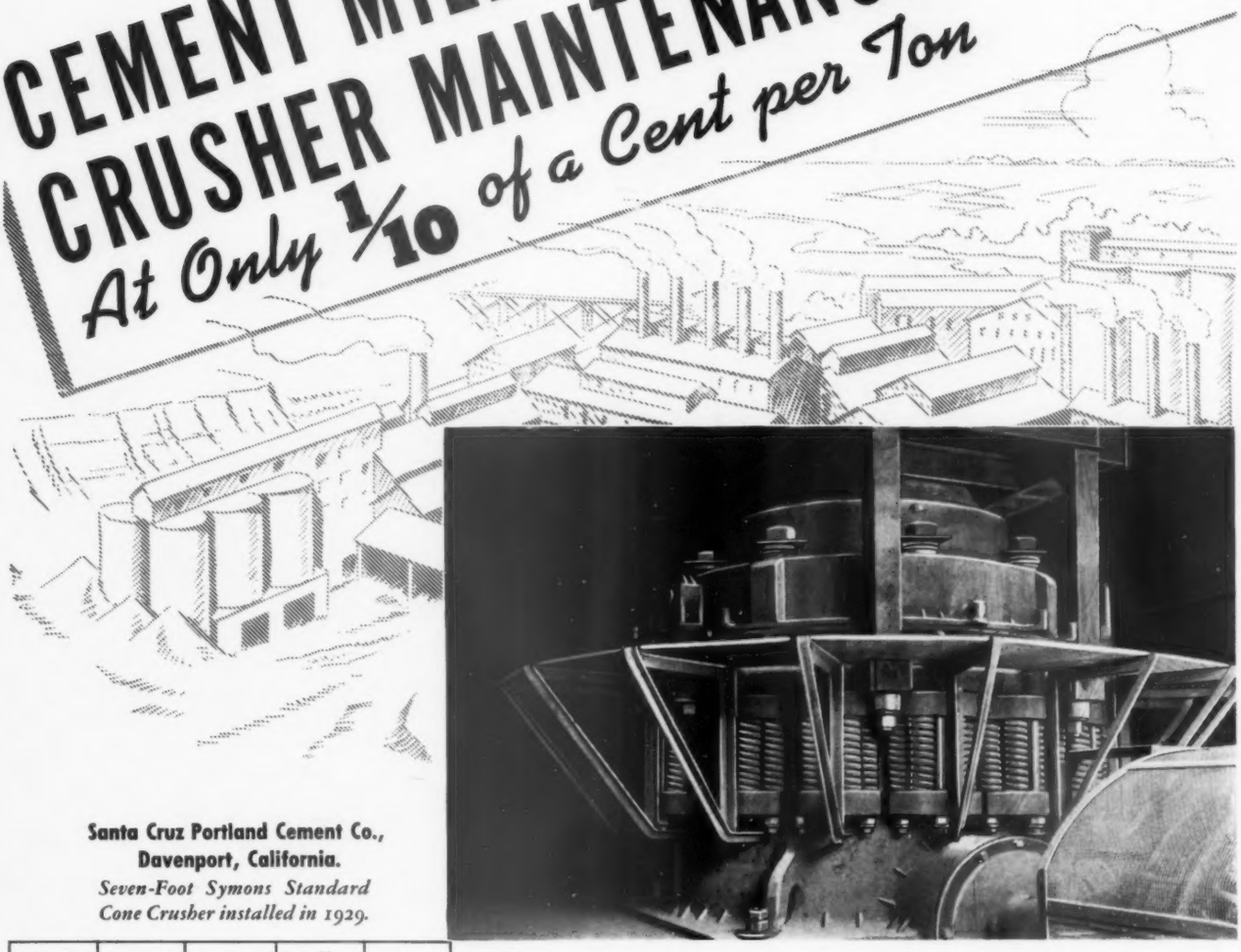
PURPLE STRAND IS BETHLEHEM'S TOP-QUALITY WIRE ROPE

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

CEMENT MILL CRUSHER MAINTENANCE

At Only 1/10 of a Cent per Ton



Santa Cruz Portland Cement Co., Davenport, California.
Seven-Foot Symons Standard Cone Crusher installed in 1929.

	Sieve	% Retained	% Accumulative	% Passing
	.742"	000	000	100
	.525"	10.3	10.3	89.7
	.371"	16.6	26.9	73.1
	.263"	12.7	39.6	60.4
−3m	+4	8.0	47.6	52.4
−4	+6	7.5	55.1	44.9
−6	+8	7.0	62.1	37.9
−8	+10	6.3	68.4	31.6
−10	+14	5.0	73.4	26.6
−14	+20	4.2	77.6	22.4
−20	+35	8.1	85.7	14.3
−35	+48	3.1	88.8	11.2
−48	+65	2.3	91.1	8.9
−65	+100	1.7	92.8	7.2
−100	+200	3.0	95.8	4.2
−200		4.2	100.0	

DURING THE YEAR 1938

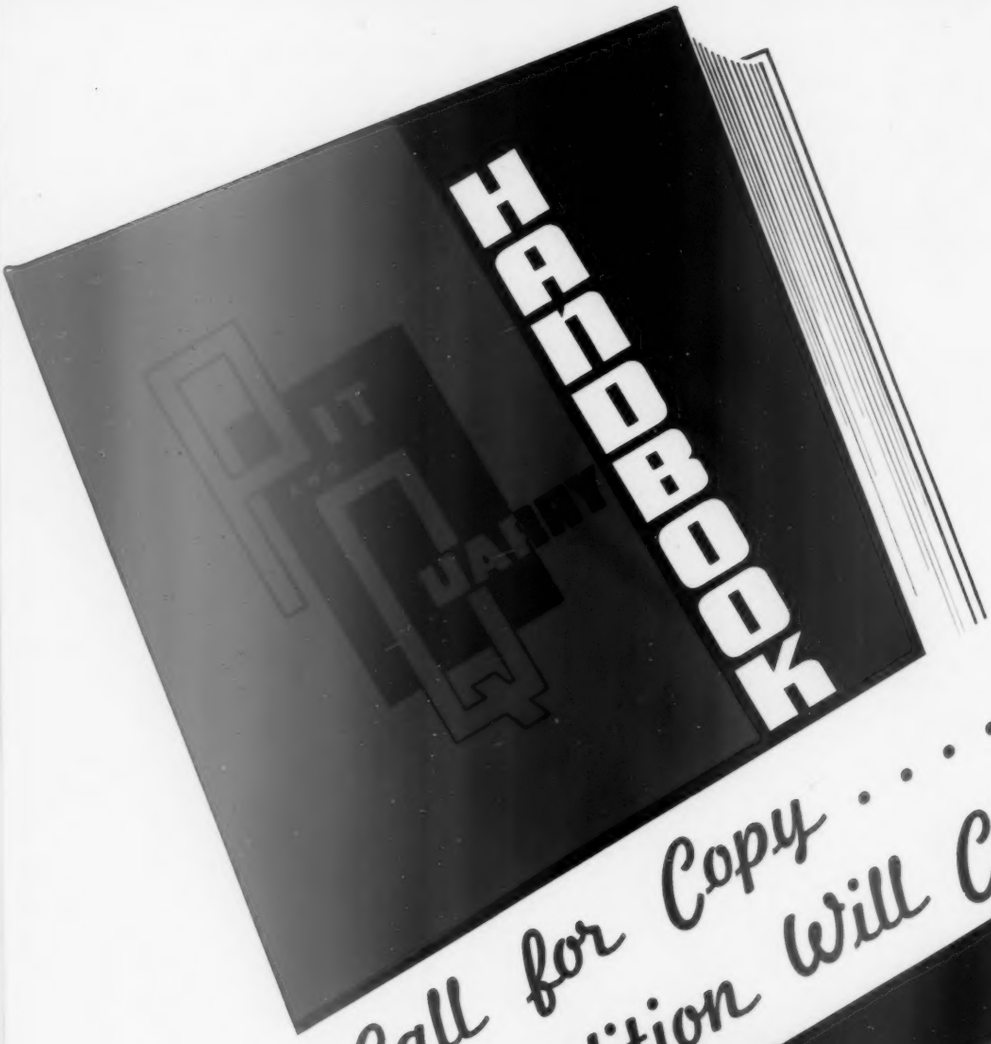
—this Symons Cone Crusher crushed a total of 350,000 tons of limestone, taking a 6 inch and minus feed and making a product of the accompanying screen analysis. Crushing was at the rate of 250 tons per hour. The repair cost for the year, including labor and material, was $350.00, or only one-tenth of a cent a ton.

This remarkable record for maintenance on raw side crushing was established after ten years of service. Installations in other mills of Symons Cone Crushers on clinker are just as outstanding. In many instances, the low crushing costs of Symons Cones have been a vital factor in reducing operating costs and in increasing profits. Whatever your fine crushing problem, investigate the advantages of Cones.

NORDBERG MFG. CO. *Milwaukee, Wis.*

NEW YORK CITY 60 East 42nd Street
LOS ANGELES Subway Term. Bldg.
TORONTO Concourse Bldg.
LONDON Bush House

SYMONS CONE CRUSHERS

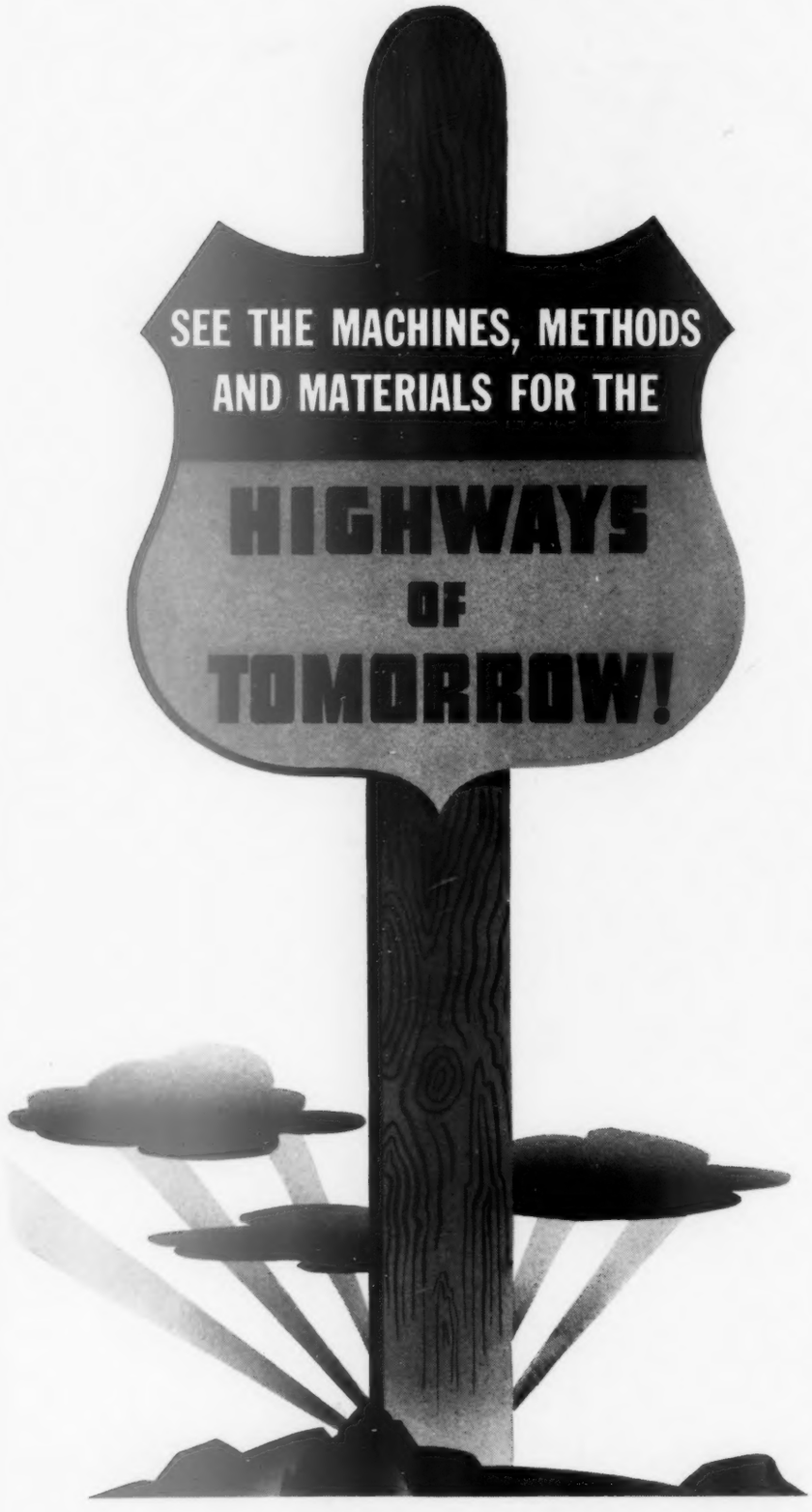


Last Call for Copy . . . . Forms for the 1940 Edition Will Close Dec. 15

Pit and Quarry Handbook offers complete sales coverage for a full 12 months . . . in a year that promises to be tops in demand for basic building materials. Catalog your products in this one and only Buyer's Manual of the industry—reach every prospect who authorizes or approves purchases in 6,080 producing plants. Here's your market, but you must act quickly . . . before December 15!

PIT AND QUARRY PUBLICATIONS
538 SOUTH CLARK ST., CHICAGO

Faster-Bigger-
New
DUMPTOR
Diesel
Powered
—Powered with Diesel engine—hauls bigger loads at higher speeds—New, improved Koehring W-60 Model Dumptor, again cuts costs of moving dirt and rock. All important features of other Dumptor models are available with the new W-60. Three speeds forward or reverse—instantaneous gravity dump—constant mesh transmission—oscillating front axle—large pneumatic tires for maximum flotation—more than enough power, Diesel or gasoline, are only a few of the reasons why—dirt and rock are hauled at lower costs with Koehring Dumptors.
KOEHRING COMPANY
MILWAUKEE • WISCONSIN
Part of a large fleet of W-60 Dumptors hauling tunnel excavation on the Pennsylvania Turnpike.
KOEHRING
HEAVY DUTY
HEAVY-DUTY CONSTRUCTION EQUIPMENT

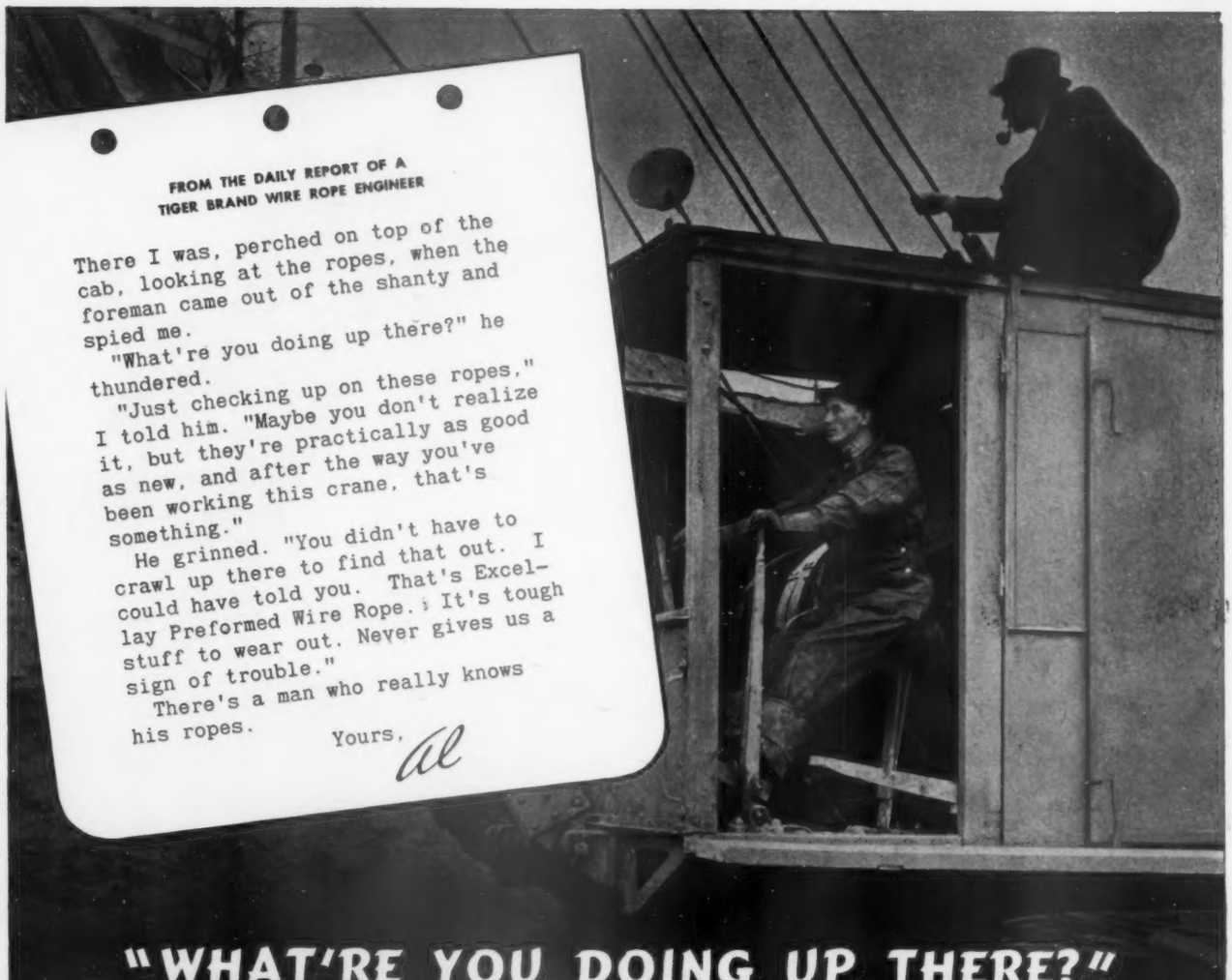


CONTRACTORS! Engineers! State and County Highway Officials! Here's your chance to see, compare and evaluate for yourself every recent development in the long line of machines, methods and materials you use on your jobs!

That's right, the A. R. B. A. Road Show and Convention is a grand opportunity to get off to the right start in 1940 — to get together with the men who know your problems; to talk shop with old friends and make new ones; to get a line on how your business is going to shape up in 1940! Make no mistake — you're giving yourself a break when you plan to attend the 1940 A. R. B. A. Road Show in Chicago on January 29 to February 2.

COME TO THE 1940 A. R. B. A. ROAD SHOW AND CONVENTION

International Amphitheatre • Chicago • January 29 to February 2


FROM THE DAILY REPORT OF A
TIGER BRAND WIRE ROPE ENGINEER
There I was, perched on top of the cab, looking at the ropes, when the foreman came out of the shanty and spied me.
"What're you doing up there?" he thundered.
"Just checking up on these ropes," I told him. "Maybe you don't realize it, but they're practically as good as new, and after the way you've been working this crane, that's something."
He grinned. "You didn't have to crawl up there to find that out. I could have told you. That's Excellay Preformed Wire Rope. It's tough stuff to wear out. Never gives us a sign of trouble."
There's a man who really knows his ropes.
Yours, al

"WHAT'RE YOU DOING UP THERE?" —THUNDERED THE FOREMAN

OUR field engineers are interested in seeing that you get a full dollar's worth of value out of every dollar you invest in wire rope. Most of their time is spent right out where the rope is used. There's no better place to keep in touch with wire rope performance.

That's why these engineers are qualified to give you service that is both helpful and speedy. Besides helping you select the most practical wire rope, they can often give you valuable, money-saving tips on operation. Be sure to take full advantage of their wide experience.

American Tiger Brand Wire Rope is made in all constructions and grades. Our engineers can help you specify the type best suited to your job. Ask one of these men to call.

EXCELLAY *Preformed* **WIRE ROPE**

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COLUMBIA STEEL COMPANY
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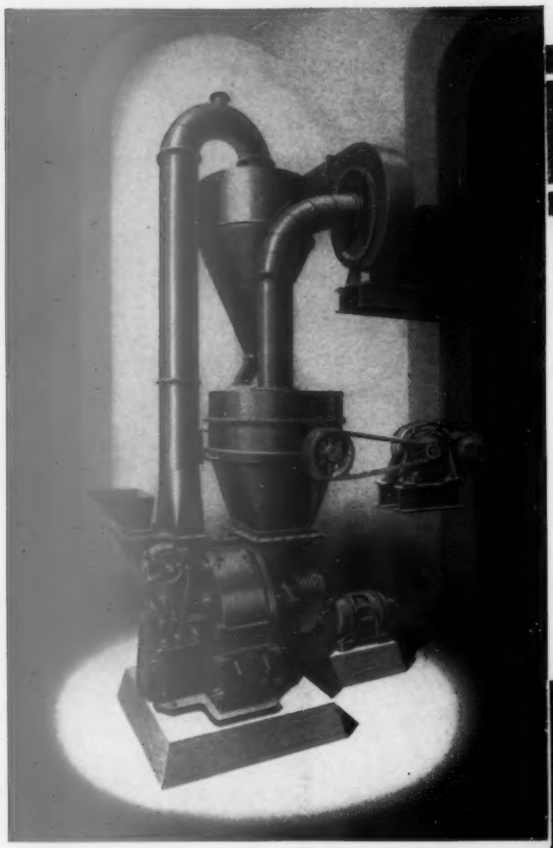
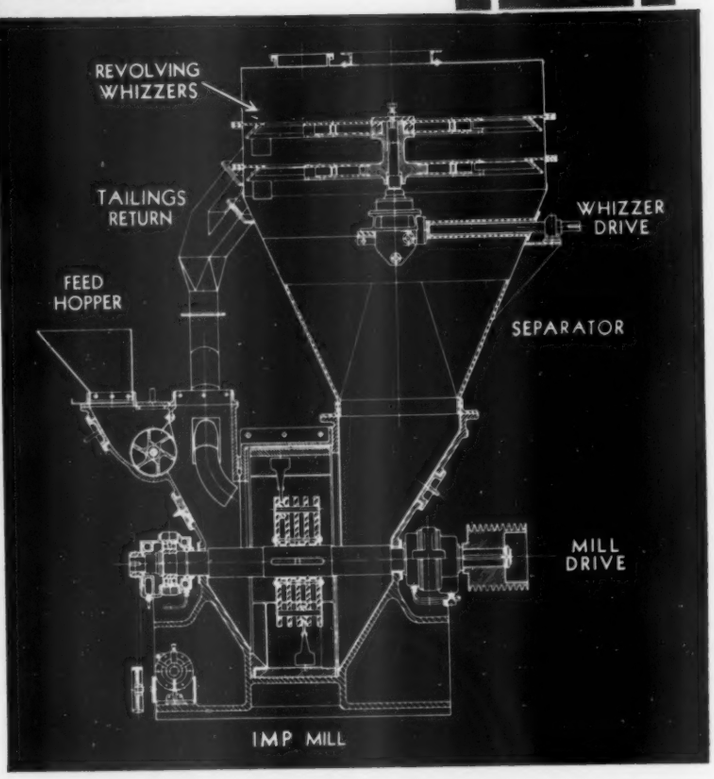
United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL



IMP MILL with WHIZZER



Cross-section of Imp Mill showing details of Whizzer. Driven through variable speed transmission, permitting wide range classification, simply by changing the speed . . . any fineness instantly, from 60% passing 100-mesh up to 99.5% through 325-mesh.

THIS combination unit offers the well known grinding economy of the Raymond Imp Mill plus the flexible fineness control of the Whizzer Air Separator.

It works equally well on dry products, or on high moisture materials when it is equipped with a Flash Drying System.

You can pulverize various chemicals, pigments, bauxite, kaolin, talc, phosphate materials and other non-metallic minerals to uniform fineness at new low costs.

Calcining gypsum, drying washed clays, producing fine grades of phosphate materials, grinding coal, pulverizing and firing pitch to kilns . . . are just a few of the many uses of this versatile mill. If you have a grinding, drying or separating problem . . . look into the advantages of the Raymond Imp Mill.

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CATALOG No. 41

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
1321 North Branch Street **CHICAGO**
Sales Offices in Principal Cities • • • In Canada: Combustion Engineering Corporation, Ltd., Montreal

PIT AND QUARRY

Vol. 32 December, 1939 No. 6

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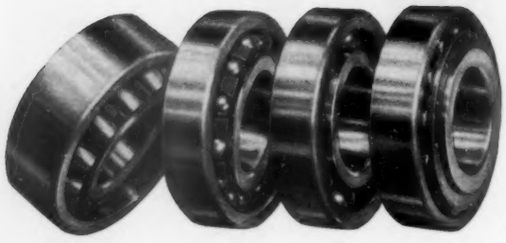
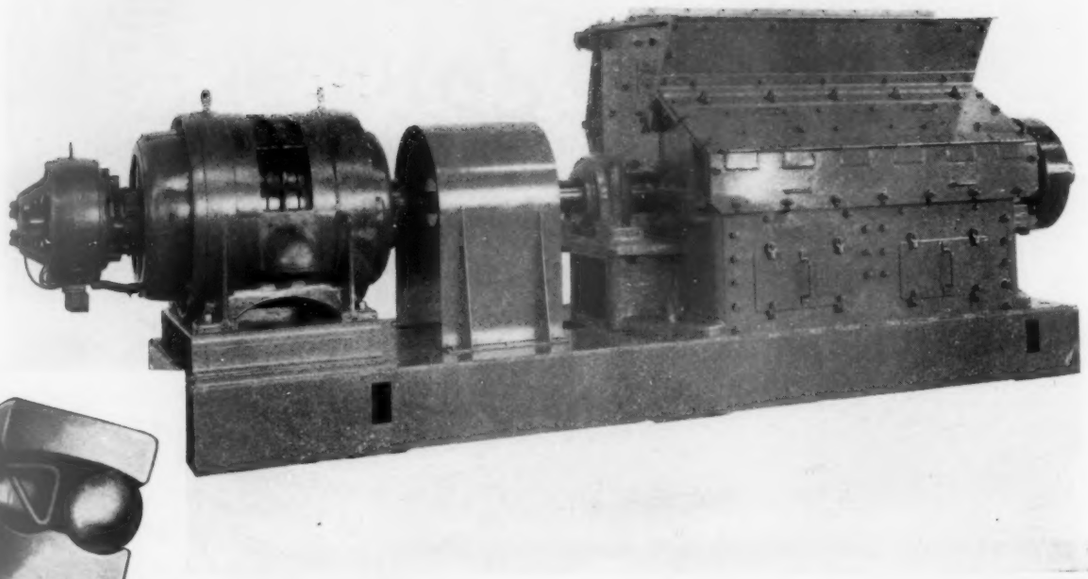


CHOSEN FOR THE TOUGH JOBS BECAUSE IT DEPENDS ON GOOD BEARINGS



● *Built by Jeffrey Manufacturing Co.*

THE MORE THIS CRUSHER FACES TOUGH JOBS, THE MORE SKF BEARINGS PROVE THEIR ABILITY TO STAND UP

● Tough jobs usually come to machines that have bearings to take care of them. Perhaps that's the reason why you find this Type "B" 36" x 60" Jeffrey Crusher always working on tough jobs. Its rotor shaft is well protected against bearing binding and wear by SKF Bearings.

Free from grit, dust, moisture and other materials among which this crusher works, SKF Bearings have the *stamina* to handle punishing loads . . . the *built-in alignment* to turn freely with the shaft . . . the *design* to simplify construction details.

Is it any wonder, then, that quarry men everywhere are reducing their operating costs with crushers that are free from bearing trouble—SKF-equipped crushers? It's the thing for *you* to do, too. An SKF representative near you will be glad to key your bearing problems to more than 3000 SKF types and sizes. 4458

SKF
Ball and Roller Bearings

SKF INDUSTRIES, INC., FRONT ST. & ERIE AVE., PHILA., PA.

PIT AND QUARRY

CHICAGO

DECEMBER, 1939

U. S. Gypsum, Lone Star Earnings Up

GAINS MADE IN THIRD QUARTER

The Lone Star Cement Corporation reports for the quarter ended September 30, 1939, consolidated net profit of $967,201, equal to $1 a share, against $805,585 or 84 cents a share in the September quarter last year and $923,661 or 96 cents a share in the June quarter this year. Nine months' net profit was $2,476,920 or $2.57 a share, against $2,328,956 or $2.42 a share in the 1938 period. Depreciation provision in the third quarter this year was increased by $73,814 and for the nine months by $220,537 under a changed method.

The United States Gypsum Company reported consolidated net profit of $2,613,003 in the third quarter this year, equal to $2.08 a share on common stock, compared with $2,127,161, or $1.67 a common share, in the preceding quarter, and $1,607,725, or $1.23, in the same quarter last year.

Universal Atlas to Add More Silos at Hudson

Construction is scheduled to begin shortly on new storage silos at the Hudson, New York, plant of the Universal Atlas Cement Company.

The new bins will have a capacity of about 150,000 barrels of finished cement.

Installs Ship-to-Shore Radio on Gravel Boat

Radio communication equipment has been installed in the steamer *J. S. Scobell* of the Erie Sand & Gravel Company's fleet, operating in Lake Erie.

Northwest Cement Union Adopts 75-Cent Minimum

Election of officers and a resolution setting 75 cents as a minimum hourly scale for the northwest district highlighted the convention of Northwestern District council of Cement, Lime, Gypsum and Allied Industry Workers, held recently in Seattle.

The council will convene again in Spokane during January, 1941, according to Melvin Ferron, fifth international vice president of the organization.

Alton McCoy of Spokane was elected president of the Northwestern council, with Edwin Jones of Seattle named secretary-treasurer.

The Material Service Company, Chicago, has ceased operation of its crushing plant south of Radom, Illinois. The equipment has been dismantled.

Coming Events

January 17-19, 1940—St. Louis, Mo. Annual conventions, National Sand & Gravel Association and National Ready Mixed Concrete Association, Jefferson Hotel.

January 22-24, 1940—St. Louis, Mo. Annual convention, National Crushed Stone Association, Jefferson Hotel.

January 29-February 2, 1940—Chicago, Ill. Annual convention and show, American Road builders Association, International Amphitheatre.

February 12-14, 1940—Washington, D. C. Annual conventions, National Concrete Masonry Association and Cast Stone Institute, Mayflower Hotel.

February 27-29, 1940—Chicago, Ill. Thirty-sixth annual convention, American Concrete Institute, Palmer House.

May 7-9, 1940—Cincinnati, O. Annual convention, National Concrete Burial Vault Association.

Court Modifies Its No-Blasting Decree

CALLED INVASION OF RIGHTS

New Jersey's Court of Errors and Appeals has modified a Chancery Court injunction which virtually forbade blasting at the Kernan Quarry in South Orange.

The appeals court decreed that, pending final hearing, the quarry may blast providing the operation does no actual damage to nearby homes, whose owners had brought suit. The previously issued Chancery Court restraint had forbidden any blasting which would cause the homes or any part of them to vibrate.

"An injunction against any and all vibration, regardless of whether damage to respondents ensues," the upper court's ruling stated, "goes far beyond fair protective needs and constitutes an invasion of appellants' property rights. Indeed, it would prevent the operation of the quarry, for it is inconceivable that this business could be prosecuted without the communication at times of some vibration to adjacent land. An interlocutary restraint so sweeping * * * should not issue unless from the pressure of urgent necessity."

The complainants had contended the blasting cracked house walls and did other damage. The quarry denied the charge.

War Cuts Imports and Aids Seaboard Plants

The disadvantage held by cement manufacturers with plants located along the Atlantic seaboard because of their vulnerability to European competition has been turned into an advantage by the outbreak of the war.

Not only has European competition in the American market been sharply curtailed, but these plants have been receiving sizable orders from South American countries, notably Venezuela, which formerly imported their cement from across the Atlantic.

Private Residential Building Rises Again

HIGHEST SINCE APRIL OF 1937

Not since April, 1937 has the dollar volume of private residential building been equal to the total recorded for October, according to F. W. Dodge Corporation in its current report on construction contracts awarded in the 37 eastern states. Total residential construction, including both private and public, amounted to $118,303,000 in October and exceeded the corresponding month of last year by $5,630,000. The most impressive gain was made in one-family residences which rose in total contract value from $70,021,000 in October, 1938 to $81,975,000 last month. As a consequence of this dollar increase, the total number of dwelling units provided showed a 13 per cent. increase in October over the same month last year, while the ten months' cumulative total of dwelling units constructed represented a 57 per cent. gain over the corresponding period of 1938.

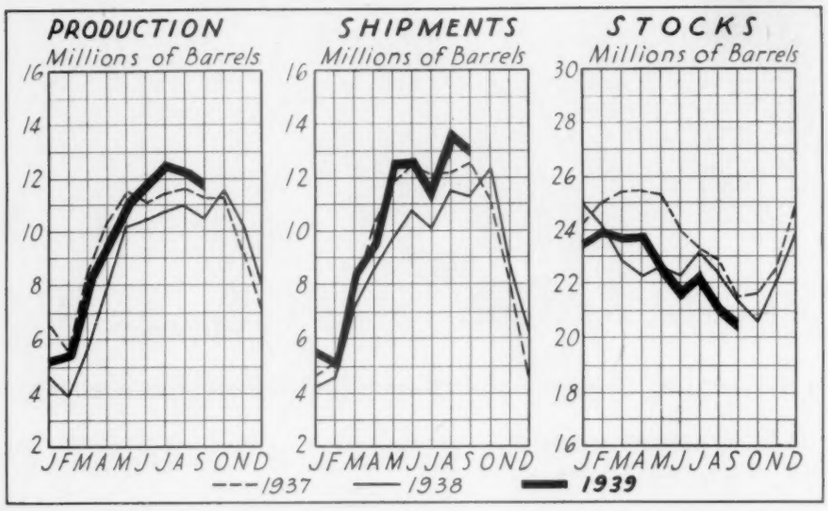
The curtailment in public building and engineering contracts, which has been in evidence during the past few months, was responsible for an appreciable decline in non-residential building in October as compared with October, 1938. However, private non-residential building continued to have a firm tone and rose to $51,776,000 last month. Commercial and manufacturing building, the two classes which generally contribute most to private non-residential construction, compared favorably with October, 1938.

Whereas total private construction increased 10 per cent. last month over October, 1938, total public construction declined 55 per cent. The net result of this divergency in trend between private and public construction was a 27 per cent. decrease in total construction in October as compared with the corresponding month last year.

PCA Issues Manual on Soil-Cement Roads

Low-cost roads for light traffic made by mixing roadway soil with Portland cement and water are described in detail in a 90-page manual just issued by the Portland Cement Association, Chicago.

Soil-cement roads were built as early as four years ago. The association, however, refrained from publishing literature on recommended practice until enough tests had been conducted on widely varying soils and until field controls had been repeated often enough to yield conclusive data on which an authoritative handbook could be written.



The Portland-cement industry produced 11,937,000 barrels in September, shipped 13,104,000 barrels from the mills and had 20,160,000 barrels in stock at the end of the month, according to the Bureau of Mines. Production and shipments, the bureau said, showed increases of 13.1 and 11.8 per cent., respectively, over September, 1938. Mill stocks were 5.7 per cent. lower than a year ago.

RECENT GOVERNMENT CONTRACTS FOR MATERIALS UNDER THE PUBLIC CONTRACTS (WALSH-HEALY) ACT

Date of Delivery 1939	Source of Supply	Government Agency	Commodity	Amount
10/10	The City Cold Patch Co., Youngstown, Ohio..	W. P. A.	Asphaltic concrete	$24,900.00
Indef.	The Permanente Corp., Oakland, Calif.....	Procurement	Portland cement	Indefinite
12/31	Schwartz Supply Co., Inc., New Orleans, La..	W. P. A.	Portland cement	46,520.00
Indef.	Oregon Portland Cement Co., Portland, Oregon.....	Procurement	Portland cement	Indefinite
Indef.	Pennsylvania-Dixie Cement Corp., Chattanooga, Tenn.....	War Engineer	Cement	38,100.00
11/29	Whitehall Cement Mfg. Co., Cementon, Pa....	W. P. A.	Cement	26,362.50
Indef.	Capitol Concrete Products, Inc., and Lock Joint Pipe Co., Scotia, N. Y.....	W. P. A.	Concrete pressure pipe	15,652.95
10/11	The Standard Slag Co., Youngstown, Ohio..	W. P. A.	Slag	23,188.00
12/31	Louisiana Materials Co., Inc., New Orleans, La.....	W. P. A.	Concrete sand	12,840.00
12/31	Louisiana Aggregate Co., Inc., New Orleans, La.....	W. P. A.	Gravel	31,694.40
Indef.	Indiana Limestone Corp., Bedford, Ind.....	W. P. A.	Limestone	62,700.00
Indef.	New Haven Trap Rock Co., New Haven, Conn.....	War Engineer	Riprap, screenings	38,315.00
6/30/40	Batesville White Lime Co., Batesville, Ark...	Agriculture	Calcium limestone	Indefinite
12/31	American Limestone Quarry Corp., Wingdale, N. Y.....	Agriculture	Ground limestone	Indefinite
12/31	The Connecticut Agstone Co., Danbury, Conn.....	Agriculture	Ground limestone	Indefinite
12/31	The Conklin Limestone Co., Inc., Canaan, Conn.....	Agriculture	Ground limestone	Indefinite
12/31	D. U. Smith, Ashley Falls, Mass.....	Agriculture	Ground limestone	Indefinite
12/31	New England Lime Co., Adams, Mass.....	Agriculture	Ground limestone	Indefinite

In the association's development department, laboratory and testing procedures have been in progress for almost five years. Approximately 1,000 soil samples ranging from a coarse sand to a very heavy clay have been examined and their durability as road material when mixed with Portland cement determined. Field construction procedure and equipment requirements have been evolved from experience gained on over 111 projects scattered through 28 states.

34 Aggregates Concerns Cited for Price Cutting

Seeking to correct a year-old price war within the industry, 34 crushed-stone and gravel firms were named in an injunction suit filed before Superior Judge Emmet H. Wilson in Los Angeles recently.

The court issued preliminary injunctions against half of the firms, who defaulted or agreed to the suit, while the remainder were ordered to show cause why they should not be prevented from selling products below cost.

The suit was brought under the California Unfair Practices Act by the Institute of Rock and Sand Producers, Inc., a voluntary price-policing organization in Southern California.

New Rock-Wool Plant Built in Minnesota

The formation of the Carney Rock Wool Company, a subsidiary of the Carney Cement Company, has been announced.

A new mineral-wool plant is now under construction at Morristown, Minnesota, and operations are expected to start this month.

Road-Research Body Meets This Month

SESSIONS BEGIN DECEMBER 5

From Washington, D. C., comes announcement of the Nineteenth Annual Meeting of the Highway Research Board, to be held this year from December 5 through 8 at the National Academy of Sciences. Department meetings will be held on Tuesday and Wednesday, and Board meetings on Thursday and Friday. Considerable time has been set aside for informal discussions in view of the success which that policy met with last year.

According to a tentative schedule released by R. W. Crum, director of the board, sessions of the departments and committees will probably be held as follows: Tuesday Morning—soils, materials, construction, roadside development. Tuesday Afternoon—joint session on soils and design; roadside development. Wednesday Morning—economics, maintenance, joint session on design and traffic; Wednesday Afternoon—traffic, design, joint session on finance and economics.

Bushnell Chairman of Safety Council Group

Following the annual National Safety Congress held recently at Atlantic City, P. N. Bushnell of the Missouri Portland Cement Company was named general chairman of the Cement and Quarry Section of the National Safety Council. R. W. Dittmar, Universal Atlas Cement Company, was chosen vice-chairman and A. J. R. Curtis of the Portland Cement Association was re-elected secretary.

Jack Dempster of the Canada Cement Company will again edit the News Letter. Other members of the executive committee are as follows:

Engineering Committee Chairman—J. B. Zook, Great Lakes Portland Cement Corporation.

Membership Committee Chairman—Henry A. Reninger, Lehigh Portland Cement Company.

Program Committee Chairman—H. F. Yotter, General Crushed Stone Company.

Publicity Committee Chairman—David Adam, Lawrence Portland Cement Company.

Statistics Committee Chairman—W. W. Adams, U. S. Bureau of Mines.

Members at large will include: Th. Avnsoe, Lone Star Cement Corporation; W. H. Baker, J. E. Baker Company; E. D. Barry, Universal Atlas Cement Company; J. R. Boyd, National Crushed Stone Association; R. B. Fortuin, Pennsylvania-Dixie Cement Corporation; Alexander Foster, Jr., Warner Company; O. M. Graves, General Crushed Stone Company; F. B. Hunt, Dewey Portland Cement Company; S. W. Stauffer, National Lime Association; F. E. Town, Meduso Portland Cement Company; A. L. Worthen, The New Haven Trap Rock Company.

Develops Volcanic-Ash Deposits Near Mojave

Extensive development work on undeveloped resources of volcanic-ash deposit in the Black mountain district, 36 miles north of Mojave, California, is being started by the Calsilco Corporation. A four-roll Williams mill rated at five ton per hour of minus-100 mesh material, is being installed, according to G. A. Reynolds, of Los Angeles, president of the corporation. Granules for insulation and acoustic plaster are also produced from the material. At the present time the corporation furnishes a refined product to the Holly Cleanser Company for use in making a household cleaner by the same name.

Insulating and acoustic plaster material is manufactured by the Gypsum Manufacturing Company of Los Angeles. H. E. Stillwell is in charge of plant operations.

Fire Destroys Gravel Plant on Ohio River

The Archbold Sand and Gravel Company's plant on the Ohio river at Evansville, Indiana, was practically destroyed by fire on the night of Thursday, November 9.

Victor Herrenbruck, secretary of the company, could not give an estimate of the exact loss. With the exception of tools, most of the damage was covered by insurance, it was stated.

No theory on the origin of the fire has been advanced. It was the second blaze at the plant within a little less than two months, the first fire having destroyed a derrick and hull of a barge. A crew of eight, including a night watchman, was employed at the plant.

EMPLOYMENT AND PAY-ROLLS

(Compiled for PIT AND QUARRY by Isador Lubin Commissioner of Labor Statistics, U. S. Dept. of Labor)

Industry	Establishments	Number of Employees	Pay Rolls (1 week)
Cement:			
August, 1939	135	21,536	$592,150
September, 1939	135	21,292	576,659
Percentage change		—1.1	—2.6
Quarrying and non-metallic mining:			
August, 1939	1047	38,050	$845,142
September, 1939	1047	37,850	842,063
Percentage change		—0.5	—0.4

Riffle-Box Gold Is Dumped Into River

U. S. AGENTS DISCARD $3,000

Because of a legal technicality, the Federal government dumped gold worth about $3,000 in the Sacramento River near Pollock, California, recently.

The gold was reported to have been caught in a riffle-box installed at the sand-and-gravel plant operated by the Clifford Dunn Construction Company on U.S. Bureau of Reclamation property. The permit for the plant allowed it to recover only sand and gravel for use in building a road to the Shasta Dam project.

Four employees of the Bureau of Reclamation, hearing that gold had illegally been caught in the box, appeared at the plant, took the gold from the box, dumped it into the river in sacks, then burned the riffle-boxes, panned the ashes and dumped the residue in the river.

The aggregates plant of F. H. Gates, Inc., at Sisquoc, California, has a special use for worn-out automobiles.

Here, "junk jallopies" by the hundreds have been used as the backbone for a system of dikes or levees designed to keep flood waters out of the pit and plant during the winter rains when the Sisquoc River overflows its banks.

Recent Equipment Installations * * *

Seco vibrating screens, made by the Screen Equipment Company, have recently been installed by the Romesburg Stone Company, Garrett, Pennsylvania; Gravel Products Company, Buffalo, New York; Maryland Slag Company, Sparrows Point, Maryland; Bituminous Limestone Company, Hillsboro, Ohio; and Frontier Bituminous Materials Corporation, Lockport, New York.

Dust-collecting systems made by the Northern Blower Company have been installed recently in the Cementville plant of the San Antonio Portland Cement Company; Kosmos Portland Cement Company; and in the Victorville plant of the Southwestern Portland Cement Company * * * *The Wabash Sand & Gravel Company, Terre Haute, Indiana, has ordered a new dredge boat from the American Dredging Company* * * A 330-foot Quaker City belt-conveyor, Universal crusher and Simplicity vibrating screen is new equipment at the crushed-stone plant of the River Products Company, Iowa City.

The Concrete Products Company of Rock Island, Illinois, has installed a J. B. Foote hammered concrete stripper * * * *A 100-horsepower International Diesel engine is now furnishing power at the West Franklin, Indiana, plant of the Hansbarger Stone Company* * * Three Chain-Belt truck mixers, each of 4 cubic yards capacity, mounted on International trucks have gone into service in the fleet of the West Virginia Sand & Gravel Company, Charleston.

CURRENT BUSINESS INDICATORS

Brisk business continued into November. The Federal Reserve Board index of volume of industrial production rose from 111 in September to 120 in October. Preliminary indications are that the index may have gone as high as 125 in November. This level is reminiscent of ten years ago for the peak reached in June, 1929 was exactly that figure. Steel and mining have led the upward surge. The steel industry operated at 90 per cent. of capacity in October and the actual volume of ingot output was the highest of any month on record. Production continued at an even higher rate in November, and reached 93.5 per cent. of capacity for the week ended November 18. The lessened rate of increase in industrial activity in November in many industries was due to their actually approaching capacity operations beyond which any further increase would depend upon expanded facilities.

The record level of mineral production in October was largely a reflection of the high rate of crude petroleum output, but other minerals also were active, particularly those dependent on steel and related industries for their markets.

Despite this increased activity, commodity prices in general have shown but little change following the sharp spurt in September. In fact, prices of several commodities actually have dropped slightly during the past month.

Of far greater importance to producers of nonmetals, however, is the situation in the construction industry. Construction is not faring nearly as well as steel and other industries that have been stimulated by orders or expectation of orders from abroad. Contracts awarded in October were about 20 per cent. below those in September, according to the F. W. Dodge Corporation. For 10 months of 1939 awards were 4 per cent. above the comparable period of 1938 but it is to be expected that this advantage will be wiped out in November and December, for 1938 closed with a deluge of public contracts, whereas, in 1939 a sharp drop in publicly-financed construction has been apparent since September. (See accompanying table)

Residential contracts have held up well for 10 months of the year, exceeding the comparable period of 1938 by over 40 per cent. September awards were only slightly below the peak in May, and October was only about 10 per cent. below September. Nonresidential construction for 10 months was only 3 per cent. above 1938. Any increase in industrial building to date has been counterbalanced by the drop in publicly-financed nonresidential construction. Contracts for public utilities for 10 months were 10 per cent. higher in 1939 than in 1938.

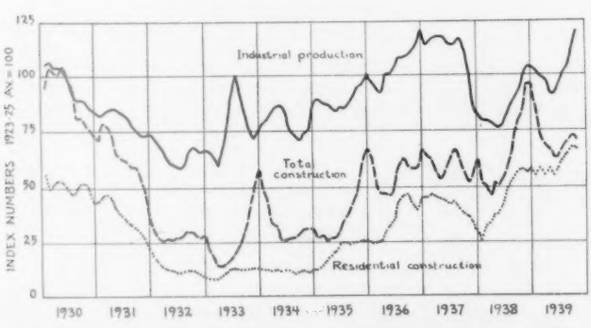
The relation between public and private ownership in construction is significant. During the building boom of the 20's publicly-financed construction was of little consequence. Huge sums of private capital were seeking outlets and much of it found its way into the building industry. With the collapse during the depression private construction all but disappeared and Government spending through public works programs took a commanding lead. In the past five years public and private spending have seesawed back and forth, but in 1939 privately-financed construction remained firm while public contracts slumped.

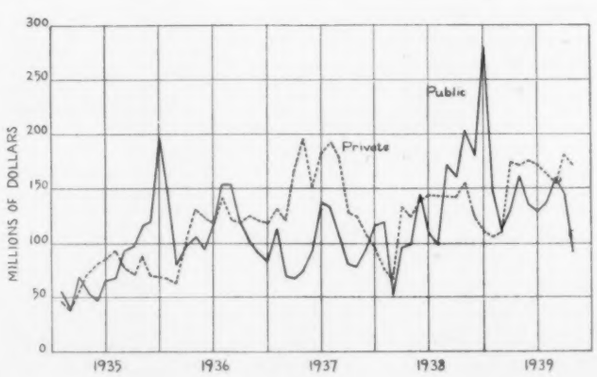
The construction industry still has a long way to climb to reach the level of industrial production in general. If the European war continues, construction should thrive along with other industry unless increases in material prices and labor costs curtail building activity. If the United States enters the war, and the prospect seems less likely than a few weeks ago, building like everything else will be under strict control of the Government. The effects of peace in Europe are more difficult to evaluate. Industry in general doubtless would slump drastically below present near-capacity levels but construction, particularly residential, might well start its long-predicted upward cycle. Another situation interesting to watch will be the investigation of the building industry by the Department of Justice. Irrespective of its outcome, a valuable fund of data should be forthcoming from the inquiry.

CONSTRUCTION CONTRACTS AWARDED IN 1939, BY MONTHS AND CLASS OF CONSTRUCTION

(F. W. Dodge Corporation, 37 States; millions of dollars)

Month	Residential	Nonresidential	Public Utilities	Public Works
Jan.	80	85	30	57
Feb.	79	70	19	53
Mar.	125	98	20	58
Apr.	114	95	35	86
May	134	77	22	76
June	112	93	10	74
July	109	89	23	79
Aug	127	70	20	95
Sept	130	82	40	71
Oct.	118	73	20	50





Industrial production and construction compared above. At right, construction financed with public and private funds.

Explosives Should Be Properly Stored to Insure Satisfactory Results

Many users of explosives do not obtain full dollar value from their explosives because of improper storage, Cecil Fisher, manager of the storage and delivery section, explosives department of E. I. du Pont de Nemours & Company, said in an address October 18 before the National Safety Council meeting at Atlantic City.

"Explosives left or stored where they can absorb moisture will have a lowered efficiency which means loss of money value to the purchaser," Mr. Fisher said. "Explosives stored in damp underground locations, left on damp ground, or in the open air unprotected from the elements will not give the most satisfactory results and may cause misfires."

Mr. Fisher spoke on the subject "Safe Storage and Handling of Explosives." Storage may be safe, but unsuitable, or may be suitable to protect the explosives, but absolutely unsafe, he said.

"Suitable storage is not a question of individual opinion, but is based upon the characteristics of the explosives and has been standardized through years of experience. It may be defined as protection from moisture, the weather, fire, excessive heat, theft and entry by unauthorized persons."

Failure to move the oldest stock first may not only cause misfires, but have even more serious results. Incoming fresh stock should never be piled in front of stock already on hand.

"The location of the magazine should be such that in the event of an explosion of the contents of the magazine, there will not be any injury to persons or damage to buildings or other property in the vicinity of the magazine." The American Table of Distances specifies the distance magazines containing given quantities of explosives should be located from inhabited buildings, railways and highways. If there is no barricade around the magazine, these distances should be doubled.

"It may sometimes be found impossible to provide the desired storage in one magazine and comply with the Table of Distances or state laws. In such cases two or more magazines may be erected to reduce the amount stored in each so as to conform to the table, or state law.

"If more than one magazine is built in the same location, each magazine (except blasting or electric blasting caps) containing more than 5,000 pounds of explosives and not over 25,000 pounds should be at least 200 feet from any other magazine, and if over 25,000 pounds of explosives are to be stored in a magazine, the distance between such magazine (200 feet) should be increased by 2⅔ feet for each additional 1,000 pounds over 25,000 pounds."

The distances between magazines may be reduced one-half if the magazines are effectually protected by barricades.

"It is appreciated that cost of operation is an important factor in any business, but certainly in the case of a magazine location safety must be considered first, as the probable loss of life and the cost of other damage is far out of proportion to the amount involved in the additional expense of operating a safely located magazine versus one that is located merely from a cost of operation or convenience point of view.

"No markings of any kind should be painted on storage magazines unless required by state law. It has been found that markings or signs on magazines become targets and invite irresponsible persons to shoot at the buildings.

"Care should be taken in the selection of men chosen to handle explosives; most experienced men are familiar with the hazards met with in the use of explosives but some are careless and negligent of these hazards. Carelessness, ignorance and false bravery are the characteristics that the explosives user can well do without and men having these characteristics should not be permitted in the loading crews."

U. S. Leads World in Talc Production

The United States has been the outstanding producer of talc, pyrophyllite, and ground soapstone, producing in recent years about two or three times as much as any other country, the Bureau of Mines states in a recently issued report. Domestic production comes largely from New York, Vermont, North Carolina, and California. Production of pyrophyllite is confined to North Carolina.

Talc is a hydrous magnesium silicate, and pyrophyllite is a hydrous aluminum silicate, with similar crystal structure and physical properties. Soapstone is essentially an impure talc. These materials are characterized by their softness, greasy feel, pearly lustre, white color. and perfect basal cleavage. Talc has good electrical insulating properties, resists the action of most acids and alkalies, and has exceptional heat-retaining capacity. Most commercial talcs are not pure, but contain other materials occurring in the deposits, and left in the product.

Commercial deposits of these materials are found in the United States in a belt containing much-altered ultrabasic igneous rocks and metamorphosed limestones, extending from Vermont to Alabama, and in the much folded and altered mountainous belt along the Pacific Coast. The only commercial pyrophyllite deposits are hydrothermal replacements of acidic volcanic rocks in central North Carolina.

Except in the ceramic industry most of the uses of these materials depend upon physical rather than chemical properties. In the ceramic industry talc and pyrophyllite are used in tile and whitewares, and in sagger bodies. Calcined talc is used for insulators and refractories. In the paint industry talc is used both as an extender and as a pigment. In the paper industry it is used for loading the better grades of paper and for coating roof paper. The lubricating properties of these materials are utilized in many industries. These materials are likewise used in various industries as fillers, and to some extent as abrasives and polishers of softer materials. Talc is the base of various toilet preparations.

Sales of domestic talc in recent years have fluctuated about the 200,000-ton level. The bulk of the material sold has come from New York and Vermont, but since 1932 increased quantities have come from California and North Carolina. All of the pyrophyllite has come from North Carolina. The domestic market, the largest in the world, consumes most of the large domestic production and also imports some hundreds of tons annually. Ninety-eight per cent. is taken in the ground form. The largest markets are in the states east of the Mississippi and north of Virginia. California talcs of industrial grades are restricted to the western states. The paint, ceramic, roofing, paper, and rubber industries form about 77 per cent. of the market for these materials. The paint industry alone takes a quarter of the total production. The demand for ceramic uses has increased from less than 2,000 tons in 1931 to over 29,000 tons in 1937 and 1938.

Ground talc is sold on the basis of grain shape (flake or fibrous), grain size (20-325 mesh), and color (white to dark).

Prices have ranged from $4 to $85 for the various grades of ground talc, pyrophyllite, and soapstone, to as high as $800 per ton for high-grade lava talc.

EDITORIAL

Our Economic Future

MOST of us, despite the improvement in economic conditions which has for many months been apparent everywhere about us, are still not content, but secretly, if not openly, strive to attain the heights of economic income and so-called security of a decade ago. We arbitrarily select a price level of years ago as the objective of all present-day effort without even inquiring what there was in that level, beyond its extreme height, to justify its adoption as a standard of accomplishment. We look back with tearful eyes upon the sales volume of the 'twenties and measure our present state of misfortune by comparison with it, not even pausing to inquire whether the old level may not have been the result of temporary causes which can not be expected to occur again and not stopping to wonder whether the conditions of that period may not have been unhealthy and contributory to an unrecognized degree to the economic stress that we have since experienced. Looking backward, however natural it may be from the psychologists's point of view, is not a habit conducive to the adoption of a rational outlook toward the future. The mistakes of the past are dependable guides as to what to avoid, if we recognize them as such and understand their causes and results, but without the ability to interpret them, without the vision to foresee something better, they are nothing beter than archives of antiquities.

It may be worth asking those of us who remember the giddy "twenties" whether we have the courage to face a continuation of the sobering conditions of the "thirties," and whether we are prepared to face with serenity the possibility—some would say even the certainty—that we shall never again see the economic hilarity of the former decade. The question should be carried beyond that of our courage to face such a future and made to include one as to whether we should not actually prepare ourselves to meet it and survive it. What is there in our situation that justifies a hopefulness that "the good old days" can be brought back, that the easy-coming easy-going days of the late 'twenties can be inserted in the calendar of our future, that a repetition of those times, even if it could be brought about, would be good for most of us? A candid examination of the facts leads us to say, "Nothing." We can not discover a single fact, a single tendency, in the economic situation of this day that would warrant any one of us in believing, on anything stronger or weightier than sentimental longing, that the buying, investing, gambling and producing orgy of that period will be repeated. Those who grew rich through that "golden age" may hope for its return, those who fancied themselves in a state of economic security then may hopefully await its second coming, those who dozed through the mental languor of the period may desire to remain tranquil through another such intellectual coma. Yet, we repeat, we see nothing in current conditions or trends that favors a recurrence of a situation that had nothing to recommend it except its value as a lesson in the costs of economic delirium and social complacency.

What, for instance, can we expect with regard to unemployment? We have always had some degree of unemployment; even during the "boom" millions of persons who were willing to work could not find work. Yet we erected a producing plant capable of supplying the country's needs on the assumed basis of full employment; we invested money gullibly and hopefully without stopping to question the need for the rapidly-increasing production facilities which our investments made possible; we pushed the art of selling to the then-known limits of ingenuity and variety; the consumer was looked upon as a person of infinite wants and inexhaustible buying power; and birth control was viewed with growing apprehension as a damper on our ability to breed consumers in ever-increasing numbers.

IT has been shown that at its present rate of growth our population will become practically stationary by 1955. In this statistical prediction some have found comfort, foolishly believing that the production of consumer and capital goods will then find a permanent level on which it can be profitably supported without the burden of caring for a population increasing more rapidly than the ability of industry to employ it. On the other hand a relatively static population, consisting in increasing proportion, as time goes on, of elderly persons whose economic contributions to society decrease while their economic needs increase, will be forced to lean more and more heavily on the shrinking number of those who can contribute in excess of their needs. A society that can not provide economic opportunity for an increasing population may in time find itself in the position of becoming less and less able to support even a declining population. What should be economic power would under such circumstances become economic impotence.

Even with our decreasing rate of population increase, we are breeding potential workers faster than we can employ them. While a lengthening of the normal period of formal education in youth is withholding large numbers of job hunters from the competitive labor market, the discarding of workers who are over forty years old is increasing the rivalry for jobs in that market. We are tolerating conditions which are shortening the length of time during which one can earn a livelihood at the same time that the rate of net population gain is decreasing. Yet, the number

of economic opportunities is not keeping pace with even our restricted rate of population increase. Every year some two million boys and girls emerge from our schools and colleges, most of them urgently in need of economic opportunities, which large numbers of them can not find. Each year the number of job hunters increases by approximately 700,000, and industry is not able to find useful and gainful employment for them. Between the shortening of the earning period of the average worker and the inability of industry to provide economic opportunities in proportion to population growth we are passing rapidly into that state of things wherein in another ten years we shall have 7,000,000 more persons of working age than we have now. Will industry provide useful and gainful employment for a population so much greater than ours, when it can not now offer it to a population which has millions fewer employables competing for work?

ALTHOUGH the manufacturing industries have produced much more goods in each of several years since 1918 than it produced in that year, it has never employed as many workers. The increased output that marked the period immediately following 1918 was not accompanied by a proportional increase in employment in the manufacturing industries. The net gain in output came from an increasing use of machinery, not from an increasing use of man-power. Production in manufacturing has not yet reached the high level of 1929, yet mechanization has been going on continuously, with the net result, in so far as the employment of man-power is concerned, that labor is "even more superfluous," as one commentator has observed, than it was in years of so-called prosperity.

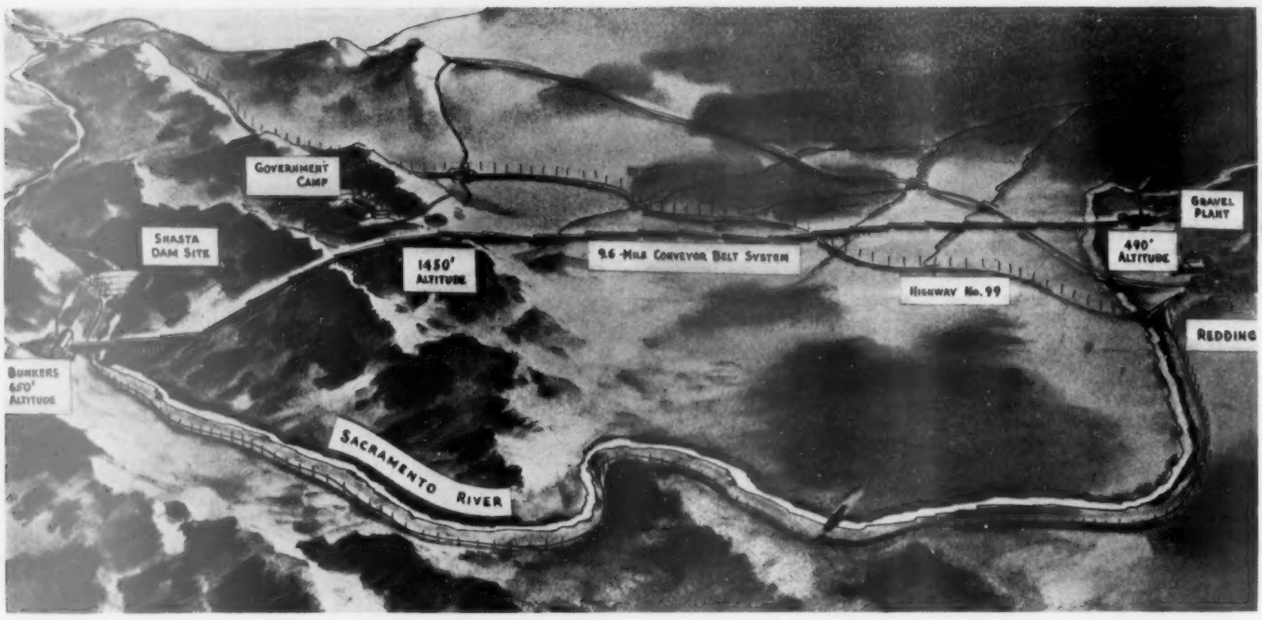
Of course, we can not go on breeding new generations of people without, at the same time but not necessarily at the same rate, increasing human wants. But the ability of the rising and coming generations to satisfy their wants is still, under all known economic systems, dependent on their ability to find occupational opportunities, and there is every reason to believe that these will not increase in proportion to the increase in the number of those who seek them. Increasing unemployment may be the result; or, under the operation of government or otherwise regulated economic conditions, the available work may be spread out so thinly that wages will be lowered and the American standard of living drastically reduced.

In the one case we can expect to see fewer and fewer people—or a smaller and smaller portion of the entire population—working to support more and more persons—or a larger and larger portion of the population. No one with a serious regard for the future economic security and happiness of our people can view such an inevitable growth in the number or porportion of economically-unproductive parasites without concern.

In the other case we can expect to see a steady decline in the standard of living, which, besides narrowing the economic outlook and happiness-and-contentment expectancy of large sections—probably most—of the population, will have the effect of shrinking the economic opportunities of the owners of production and other enterprises. Such a condition could not fail to result in a leveling downward of the standard of living of all classes in the population without offering anything by way of offsetting compensation other than the slender spiritual satisfactions that the major ity might derive from the social and economic demotion of the minority. The gap between such a society and Socialism or Communism and similar egalitarian philosophies would be nominal rather than real.

In the smugness of his home each one of us may feel inclined to smile at the thought that he should be concerned about a problem so remote. His children educated and, perhaps, married; his business or other investments bringing in a somewhat reduced but none-the-less sufficient income for a secure old age; his interest in the future losing ground daily in his increasing respect for the fading past and its traditions; the conditions surrounding or influencing the lives of many of us do not favor our developing such interest in big social problems. Thoughts involving self continue to engross our attention; preoccupation with personal problems does not incline us to assume, even through the inexpensive process of thinking, responsibility for the comfort, happiness, or economic security of those outside our family circle. If we leave a family not in want and a reputation not too badly spotted by the slight errors and false judgments of a lifetime, most of us are content to depart, believing that we have to a high degree fulfilled our mission in life, with credit and satisfaction to ourselves and with no economic cloud on the future of our posterity.

YET each one of us, according to his capacity, should be capable of contributing something worth while to the society from which we have drawn our comfort and competence. It is not enough merely to acquire and accumulate, to propagate and protect, to erect and bequeath. Those are only the mechanics of living, the *minutiae* in the routine of life. It is something that everyone does after a fashion; it is no mark of individuality, no badge of genius, no sign of social consciousness. It is of small moment when compared with what most of us might do; not in charity that seeks in its poor and utterly inadequate way to repair the damages that result from antisocial processes, but through actual striving with the problems that so seriously and unnecessarily complicate the mechanics of existence. Unless each one of us makes some contribution, however slight, to the betterment of conditions which so completely dominate the lives and determine the fates of most of us, it is presumptuous of him to feel that his work has been done, his niche filled, and his place in society earned. Economic problems are difficult problems and they need all the consideration, all the thought, and all the planning that we as individual members of society can give it.



Artist's sketch of the 9.6-mile conveyor-belt system from plant to dam site.

U. S. Advances One Million Dollars to Finance Building 9.6-Mile Conveyor

THE plan to use a 9.6 mile belt conveyor to convey aggregate from the plant at Redding to the site of Shasta Dam, major element in the Central Valley project in California, has been approved by the Bureau of Reclamation. The conveyor, estimated to cost about $1,200,000, is to be built by the aggregate contractor, Columbia Construction Company, under a change order on its $4,413,000 contract. The plan of using a conveyor belt was originated by Henry J. Kaiser, president, and proposed by him to the bureau.

The original contract obligated the Columbia concern to furnish 10,400,000 tons of sand and gravel f.o.b. cars at the quarry at an average price of about 43 cents per ton. The bureau was to arrange with the Southern Pacific Railway for transportation to the dam site. The change order directs Columbia to build a conveyor belt capable of delivering 1,000 tons per hour and to deliver gravel at the dam site, the government furnishing the right-of-way. For transportation of the first 2,420,000 tons Columbia will receive 26½ cents per ton, for the next 7,580,000 tons 18 cents per ton, and for all deliveries thereafter 19 cents per ton.

Because of the saving resulting from elimination of delivery at the railroad siding, Columbia consented to a reduction in its price for processing the aggregate to 40 cents per ton. If, through breakdown of the conveyor or otherwise, it becomes necessary to move aggregate by railway, Columbia will bear the difference between 26 cents and the railway price. The contractor is to remove the conveyor within six months after completion of the project.

To aid the contractor in financing the construction of the huge conveying system the government will advance 90 per cent. of its cost, deducting this amount from subsequent payments for the transportation of aggregates.

The net saving to the government from the transaction is estimated at $250,000. In addition, of course, the government gains the added security of having two means of aggregate transportation available.

The contract for manufacture of the belt-conveyor system has been awarded the Goodyear Tire & Rubber Company and currently is in process of production in its Akron factories. The complete system will be twice as long as the largest ever built previously.

The Goodyear company also announces completion of the installation of a mile-long belt-conveyor system at Los Altos, California, for the Permanente Corporation, which will manufacture cement for the Shasta Dam project.

The Columbia job will require approximately 20 miles of 36-inch wide, six-ply, long-staple-cotton, rubber-covered belting, weighing approximately 1,500,000 pounds. It will be installed in 26 endless, vulcanized-on-the-job units for a continuous haul of sand and gravel up to 6 inches in size from the Columbia company's plant at Redding to the working area for the Shasta Dam at Coram.

Roughly following the general contour of the rolling desert intervening between Redding and Coram, the belt-conveyor will begin its haul at an elevation of 490 feet, carry through a pass at a maximum altitude of 1,450 feet and make delivery to its extreme northern terminal at an elevation of 650 feet.

The first shipment of belt sections from Akron is scheduled for December 15 when 9,000 feet will be ready for delivery. Installation is scheduled to be completed by March 1, 1940 and the system placed in operation by April 1, 1940.

The conveyor system will be erected on wooden bents varying in height above the ground from 4 to 90 feet and will require the use of 12,500 steel troughing idlers. The 26 terminals at which links of the system overlap, will be of combination steel and wood construction. Dumping from one unit to another at the 25 transfer points will employ the use of steel chutes.

In operation on its 9.6-mile route the conveyor system will carry the aggregates over the Sacramento River at two points; over one main state highway and five county roads; across four creeks and the main line of the Southern Pacific Railroad.

The 26 links of the system each will be motivated with 200-horsepower electric motors, excepting the three most northern units which will generate power because they are down-grade, or lowering, conveyors. The component weight of the material on the slope makes these belts self-operating.

The course of the conveyor will be through the middle of an 80-foot right-of-way cleared through manzanita brush its entire length and will deviate from a straight line haul at several points to avoid hill tops on a direct line between the gravel plant at Redding and the delivery site at Coram.

The capacity of the system will be 1,100 tons per hour while conveying at a speed of 550 feet per minute. Material in transit will be on the conveyor one hour and 40 minutes between extremities. Four years of operation will be required to meet the total requirements of the dam-construction project, estimated at 10,000,000 tons.

The greatest single-day requirement of aggregate at the dam site, it is estimated, will be 22,000 tons and the conveyor working at capacity can deliver 26,400 tons in a 24-hour period. The system will operate on a 24-hour daily basis and build up reserve supplies of aggregate at the dam, rather than attempt to match daily requirements.

When completed the system will be illuminated its entire length with sodium-vapor lights, providing a spectacular sight to air travelers or others situated at high altitudes over a wide area. The purpose of the lighting, however, is to make continuous operation through the night feasible. There will be telephone stations at numerous points along the system and a motorized patrol will constantly be on duty. The system will have interlocking self-control arrangements which will stop the entire conveyor if anything should interfere with the operation of any one unit and the approximate location of the stoppage will be indicated on the control panel.

During the rainy season a temporary cover will be built over the entire system to protect the sand from getting wet in transit. The system will handle one class of aggregate at a time to simplify classification at the storage point near the dam.

The Permanente Corporation cement-mill installation, involving the use of approximately four miles of Goodyear belting, is likewise an important and unusual application of the belt-conveyor in its own right. The corporation was confronted with the problem of delivering limestone from an 1,800-foot mountain top of the California Coastal range to its plant a half-mile away at a much lower altitude. It was impossible to install a conveyor system direct from the quarry to the plant on account of the steep grade. The problem was solved by installing a conveyor system literally around the mountain in three sections to reduce the angle of grade. The three units of the system are 1500, 2200, and 1,300 feet long, respectively and are now in operation.

The entire haul being down-grade, it is possible through the use of electro-generators to generate enough electricity from the energy of the belts to operate several of the motors used in the cement-mill processes.

The capacity of the system is 700 tons per hour, conveyed at a speed of 500 feet per minute. The actual length of the haul is approximately one mile, requiring almost two miles of 36-inch, six-ply belting, the additional quantity being required for the cement mill proper.

Part of the Permanente conveyor installation. The new 9.6-mile system will be composed of sections almost identical to this.

North Carolina Ratifies Wage-Hour Agreement

North Carolina became the first state to ratify a plan of coöperation and assistance in the enforcement of the Fair Labor Standards Act of 1938 when Governor Clyde R. Hoey signed an agreement at Raleigh designating the North Carolina Department of Labor as the representative of the Wage and Hour Division and the Children's Bureau of the U. S. Department of Labor in the enforcement of the Federal Wage and Hour Law in North Carolina.

The agreement, effective November 1, 1939, follows enabling legislation passed at the last session of the North Carolina legislature.

Architectural Concrete Slabs Are Described

Beauty and Permanence with Concrete is the title of a new book that illustrates and describes architectural concrete slabs, which are defined as precast reinforced units made in large, thin, varied shapes with a white-cement matrix to set off the exposed aggregates in their true colors and textures, and which are used for interiors and exteriors, buildings and engineering structures, new work and remodeling.

The book includes descriptions of remodeled store fronts and industrial buildings, the new Naval Ship-Testing Basin, the Universal-Atlas reception room, a two-story residence, and the Baha'i Temple, in all of which architectural concrete slabs were used.

Copies may be obtained upon request from Universal Atlas Cement Company, Chrysler Building, New York.

Will Erect New Plant to Avoid Bridge Tolls

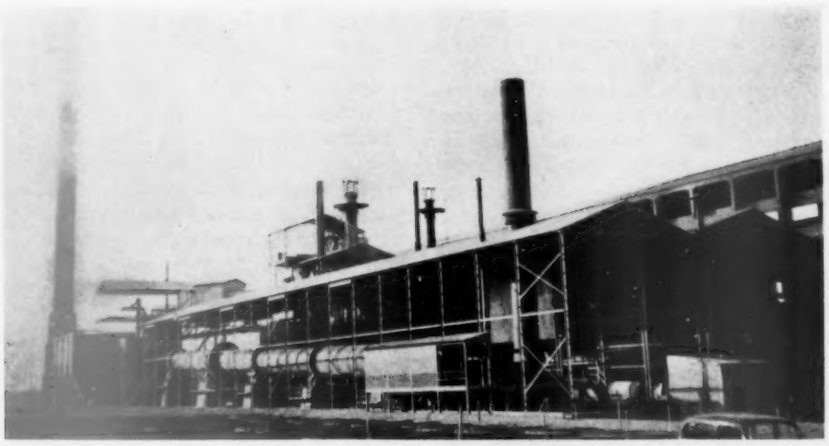
The Steckel Sand Company of Easton, Pennsylvania, has been producing its sand and gravel at Phillipsburg, New Jersey. In order to avoid a $1 per load bridge toll on material trucked into Pennsylvania, the company plans to erect another plant near Easton shortly.

The company also produces ready-mixed concrete and recently added six Mack trucks equipped with Jaeger and Blaw-Knox mixers to its fleet.

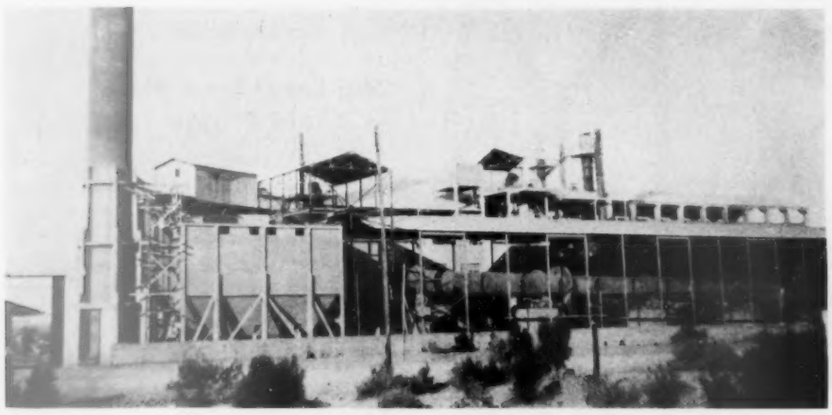
By JOSEPH M. WOLFF
Allis-Chalmers Manufacturing Company

Argentina Cement Plant Enlarged to Meet Heavy South American Demand

General view eastward of original plant. Highway to Chile crosses in front of plant. The silos are for finished cement.



View along west side of plant showing kiln, dust chamber and stack. Short stack, right, is for cooler excess air.



A view showing the kiln from the feed end.

THE installation of a complete cement-making unit has recently been completed at the Mendoza, Argentina, plant of Messrs. Juan Minetti and Sons, Ltd., Compania Sudamericana de Cemento Portland. The decision to extend the existing plant was made in view of the increased demand for cement for road-making and street-paving.

Mendoza is one of three cement plants operated by the company. A wet-process plant was built at Dumesnil, Cordoba, in 1929, and a dry-process plant was completed at Campo Santo, Salta, in the spring of 1938. Erection of the new unit at Mendoza was begun in August, 1938.

The city of Mendoza, 640 miles west of Buenos Aires, on the Ferrocarril Buenos Aires al Pacifico, in the foothills of the Andes, is the center of Argentina's large wine-making and fruit-growing industries. Its population is about 80,000. Irrigation ditches, furnished with water from mountain streams, make possible this productive area in an arid and barren region. Mendoza is less than one hour from Santiago, Chile, by plane, but the combination automobile-train trip takes 12 hours over the mountains.

The cement plant is a few miles north of the city, removed from the orchards and vineyards. The land is an undulating plain with light rainfall. It rises toward the west, meeting the 10,000-foot-high eastern range of the Cordilleras of the Andes. The unpaved

automobile road to Chile passes in front of the factory. The truck traffic on this road is considerable.

An aërial cableway, 6 kilometers long, brings both limestone and shale from the quarries, which are situated in the low hills toward the west. The pink and white massive limestone is dumped through a short bin to two Allis-Chalmers 16-inch Superior McCully crushers equipped with a reduced-throw eccentric to make a 1¼-inch product. A 10-inch Allis-Chalmers Newhouse crusher reduces the green compact shale. The crushed material falls into the storage building, 300 feet long and 50 feet wide. The calcining department is on one side of this structure, and the grinding, blending and raw-storage divisions are on the opposite, east side. At the south extremity are the fuel-oil tanks and at the north end is the pack-house.

Bins for the mills project into the storage yard and are served by an overhead, traveling crane having a clamshell bucket. The entire set of buildings is of reinforced concrete and brick, since the general use of steel is prevented by its high cost in Argentina.

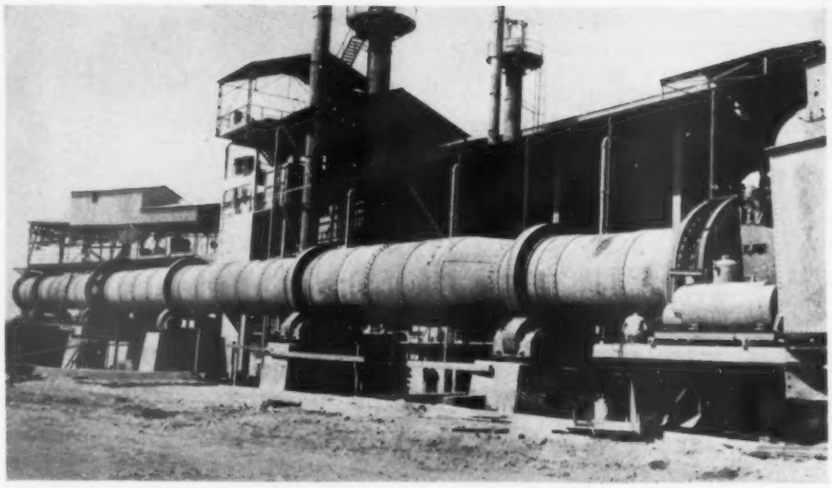
The new raw-grinding unit is an 8735 Allis-Chalmers Compeb mill fed by two 20-inch Schaffer Poidometers. The mill discharges to a 6-inch Fuller-Kinyon pump. Dust is drawn through an 11-foot Sly continuous bag filter by an American Blower Company fan. The collected dust is returned to the pump.

The Compeb mill has three compartments; the preliminary compartment is 8 feet in diameter, and the following two 7 feet in diameter. An exterior peripheral screen classifies the feed leaving the first chamber.

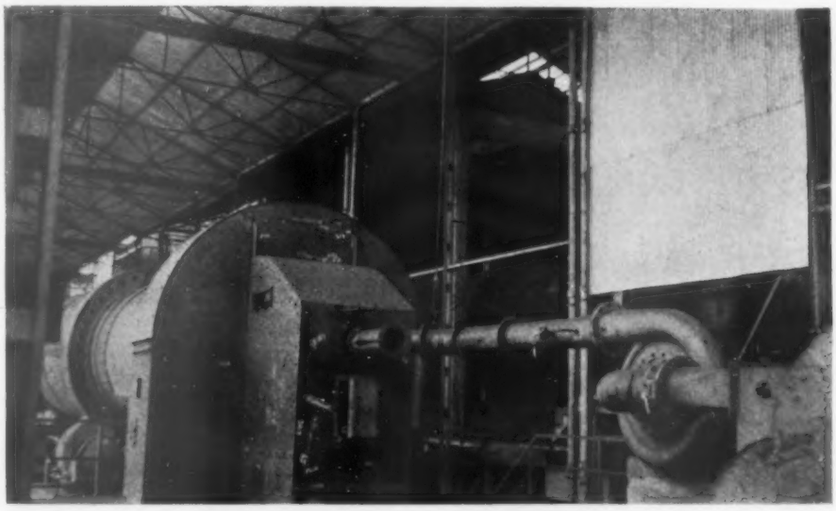
Two return-feed pipes, attached to the outside of the mill shell and each

Drive for the 260-foot kiln.

having a scoop at one end and a connection to the second compartment at the other end, feed material which has fallen through the screen and has collected inside the sheet-steel housing which incloses the return-feed pipes and the screens. Spiral lifters conduct the coarse material over the screen in the direction of the feed end, where it enters the hollow riding ring and, through



Kiln as completely set up. The 10-foot diameter calcining zone is supported between the first and second bases.



Sheet-steel firing-hood housing with air piping from turbo-blower.

that, the preliminary compartment for regrinding.

Balls from 2½ to 4 inches in diameter are put in the first compartment. In the middle chamber grinding is done with 1¼-inch Concavex balls, and in the last compartment ⅞-inch Concavex balls are used.

The feed-end support of the mill consists of a riding ring, attached to the shell about 4 feet from the feed end, and a 2-roller carrying mechanism with its supporting steel frame. The four bearings for this mechanism are lubricated by a special pump, oil tank and filter unit. In starting the mill the discharge-end bearing, which supports the hollow discharge trunnion, and the bearings for the roller-carrying frame are supplied with grease from an Alemite system at several thousand pounds pressure. The mill is, in effect, floated on the grease so that rubbing between the metal surfaces is avoided before normal lubrication begins.

The rated capacity of the mill is 25 metric tons per hour when grinding to 94 per cent. through a screen with 4,900 openings per square centimeter. A synchronous motor of 700 horsepower at 187½ revolutions per minute drives the mill.

Blending of the raw mix is accomplished in the existing silos. Provision has been made in the new raw-storage silos to pump both to the new Allis-Chalmers kiln and to the existing Lepol kilns.

The Allis-Chalmers rotary, dry-processing kiln, 8½ feet in diameter and 260 feet long with an enlarged calcining zone of 10-foot diameter, and an Allis-Chalmers air-quenching clinker cooler, 3 feet wide and 50 feet long, are the clinker-processing machines. The kiln and cooler installation was designed for a production of at least 200 metric tons per day. It is identical with the kiln and cooler unit of the Salta plant which was described in the July, 1939, issue of Pit and Quarry.

The kiln is set at a pitch of ⅜ inch

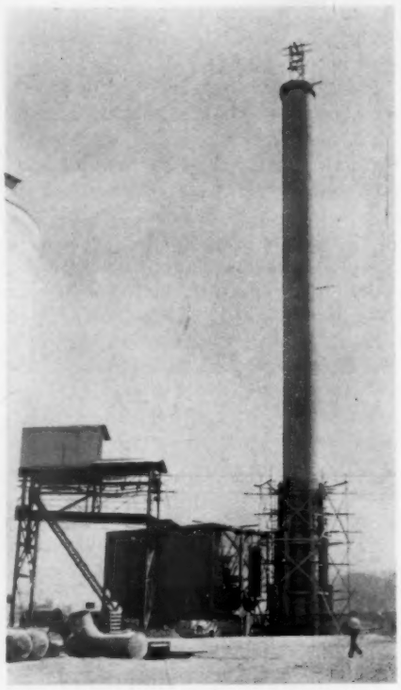
per foot and is mounted on five 2-roller supports with self-oiling, water-cooled bearings. A welded-steel cut gear, bolted to a heavy ring on the shell, and a driving pinion on the slow-speed shaft of a Falk speed-reducer, which is mounted on a specially constructed welded-steel base plate, form the propulsion unit. An Allis-Chalmers wound-rotor motor powers the drive. Providing a dust-tight protection and an oil reservoir for the spur gear and pinion is a steel casing, which completely incloses them.

The kiln is fed by a 9-inch water-jacketed screw whose speed is synchronized with that of the kiln. The motor, which drives the screw-feeder, receives its energy from a 5-kilowatt generator driven from the shaft of the kiln motor through a Texrope drive forming the synchronous tie between the kiln and the feeder.

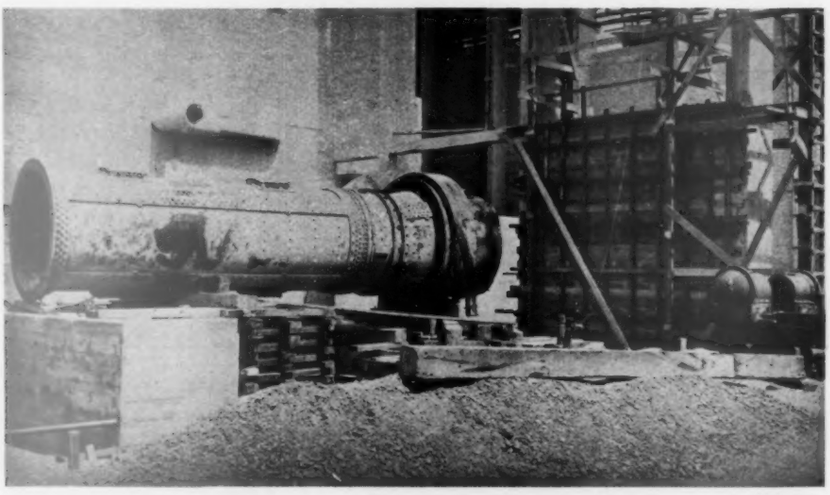
The kiln exhaust gases flow through the baffled chambers of a large concrete structure similar to that which has proved very successful at the Salta plant. The passes, in series and parallel, cause the dust to settle into long V-shaped hoppers. Losses through the stack are very low. Screw-conveyors and elevators recover the dust and return it to the steel kiln-feed bin.

Extraction of the greatest possible quantity of heat from the kiln gases passing through the kiln, while these are still at a temperature high enough to perform the definite function of driving off the CO_2 from the raw material, is the purpose of the calcining zone, which reduces internal radiation by concentrating within itself the transfer of high-temperature heat from the gas to the material. The useful heat in the gases of combustion is, therefore, utilized for each of the steps of pre-heating, calcining and clinkering.

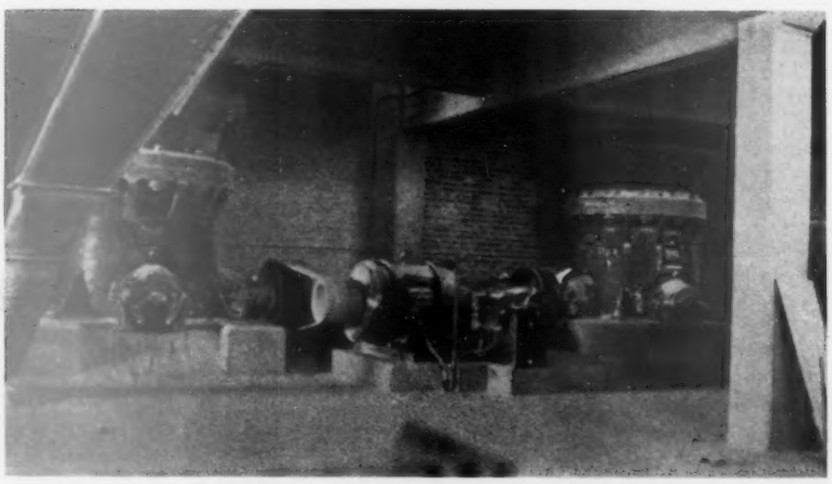
Fuel oil, used for burning, is pumped by a De Laval IMO pump through a steam-heat interchanger to the atomizer in the kiln at 250 pounds per square inch. A 15-horsepower oil-fired boiler makes steam for oil heating. Primary air for the kiln is supplied by an Allis-Chalmers single-stage 6,400-revolutions per minute, 5,900-cubic foot per minute



Construction view of kiln stack.



Raw-grinding mill during erection. Part of the roller-carrying frame at extreme right.



The two 16-inch crushers.

turbo-blower driven by an Allis-Chalmers 75-horsepower induction motor. The primary air is drawn from the outer part of the hot cooler brickwork and can be blended with cold air to any desired temperature through an automatic damper worked by a Leeds-Northrup Micromax motor control.

Heated secondary air for combustion is taken from the air which has cooled the clinker. A brick baffle wall in the cooler housing, which extends from the discharge lip of the kiln to a level about 20 inches above the cooler grates, provides independent channels for the rising pre-heated secondary air and the discharging clinker. Turbulence of the gases in the firing hood and the return of dust to the kiln is reduced. The secondary air is forced into the cooler body in controlled amounts by an American Blower Company fan equipped with a louvre damper. Two fans driven from the same motor, however, are used to cool the clinker. One furnishes cooling air which, when pre-heated by clinker cooling, is used as secondary air for combustion. The other fan furnishes the cooling air to reduce the clinker temperature to that desired.

A Shallcross pressure controller automatically maintains a constant depth of clinker on the grates of the cooler. Air pressure beneath the grates, dependent on the depth of the clinker passing over them, balances a motor-operated rheostat. The latter speeds or slows the reciprocating motion of the cooler according to the rate of kiln output.

An 18-inch by 15-inch Link-Belt

Peck Carrier transports the cooled clinker to the storage.

Identical with the raw-grinding unit is the new clinker-grinding mill and dust-collector. The feeder for the finish mill is an Allis-Chalmers 36-inch twin table-feeder and the cement pump is a 5-inch Fuller-Kinyon unit. The rated capacity of the finish mill is 15 metric tons per hour when grinding to 94 per cent. minus 4,900-mesh.

A large kiln-control panel, placed on a vibration-free, concrete platform at one side of the burning platform, gives a complete record of kiln and cooler operation. Pyrometers record temperatures in the firing hood and dust-chamber. The weight of the air entering the cooler is controlled by a Foxboro Air-Weight controller.

A Hays 4-point draft gage shows pressures or suctions at various points in the kiln-cooler system. Draft conditions in the kiln are adjusted by a Shallcross damper control in the dust-chamber which may be automatically operated.

An Esterline-Angus speed-recorder and indicator show kiln speeds, and a counter gives the total number of revolutions. Also included are a telephone to the feed end of the kiln, an Orsat apparatus, and an electric clock.

At the sides of the main panel are separate control boards for: (1) the starter and speed controller for the kiln; (2) the resistances and meters for the kiln-feeder motor; (3) the starting boxes for the air-quenching cooler, a small blower and pumps for the oil heating and pumping systems; (4) a Shallcross controller for the cooler; (5) a Foxboro flow controller and recording meter for the kiln fuel oil. These are shielded from the weather by brick walls and a sheet-iron roof.

Power for the plant is received over the transmission lines of the Compania Electricidad de los Andes, which maintains a hydro-electric plant in the mountains at Cacheuta about 20 miles away. Since increasing demands for

Air-quenching clinker-cooler body on foundations.

Partial view of control boards, with main panel at the right.

current in the city area made it impossible for the electric company to supply the plant extension, Hector Minetti, executive head of the South American Portland Cement Company, built his own power-house on the plant site. This auxiliary power station provides 2,000 kilowatts generated by three 6-cylinder, vertical Diesel engines and their generators, at 2,300 volts, 3-phase, 50 cycles. Power at 380 volts is made available for some of the smaller motors.

Although the new cement-making unit combines with the existing plant, it is actually a complete unit with the exception of the correction and mixing of the raw feed for the kiln. It is a 1-kiln, modern, dry-process plant whose machinery has been developed for the production of high-quality cement.

The extension of the Mendoza plant was designed by engineers of the Crushing and Cement Division of the Allis-Chalmers Manufacturing Company, and was erected under the general supervision of the Service and Erection Department of that company. Field erection work was conducted under direct supervision of O. A. Hartley, associated with whom was L. N. Howell, and erecting engineers of the Service and Erection Department, assisted by B. L. Cody and the author.

Marquette Launches New Diesel Towboat

The latest addition to the Marquette Cement Manufacturing Company's river fleet—the Diesel towboat *Nicholas Duncan*—was put into service on November 8 on the Illinois River.

The vessel, which is 130 feet long with a 28-foot beam, has many improved features not common to river boats, including the highly-efficient steering and handling system designed by T. R. Tarn, naval architect of Pittsburgh, and Korfund steel-spring Vibro-isolators to take up engine vibrations, which are usually found only on the finest passenger vessels. It is powered with two Atlas Imperial Diesel engines developing in excess of 800 horsepower, and is driven by twin-screw propellers. Under construction for the past ten months, it was launched after highly successful trials on the Ohio River. It has a speed of from ten to fourteen miles per hour.

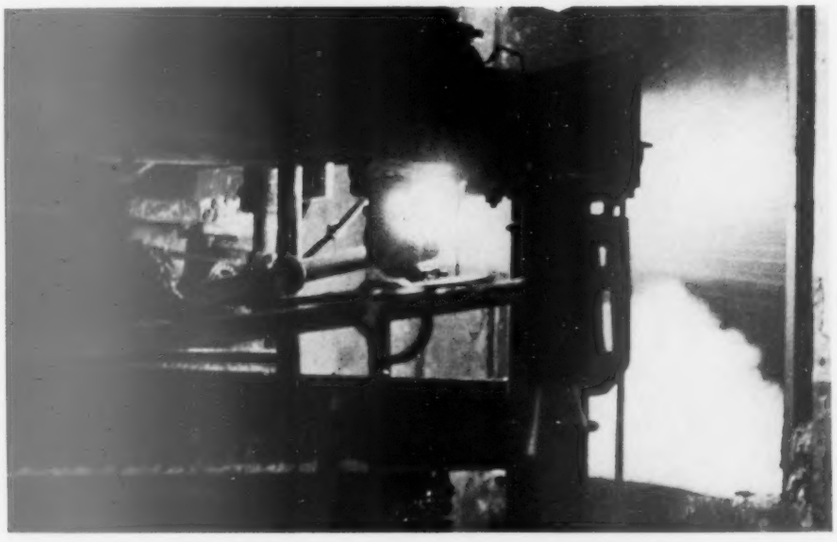
The *Duncan* carries a crew of 13 and for the present will be engaged in towing coal from East Liverpool, Illinois to the LaSalle plant of the Marquette company. At a later date the boat will be put into general use towing cement and supplies for the company's plants at LaSalle on the Illinois River, and Cape Girardeau on the Mississippi River.

The towboat is named in memory of Nicholas W. Duncan, who was a banker at LaSalle and chairman of the board of the Marquette Cement Manufacturing Company during his lifetime.

An exterior view of the rock-wool plant at Caledonia showing one of the railway sidings.

By NORA F. HENDERSON

MANUFACTURING ROCK WOOL IN CANADA



Molten rock is blown into the collecting chamber by steam under 120-pound pressure.

WHEN Gypsum, Lime & Alabastine, Canada, Ltd., celebrated in 1936 its half-century milestone as manufacturer of the famous Gyproc products, it turned with fresh vigor to a new adventure, the manufacture of rock wool, a comparatively infant industry in Canada.

While there are over 80 rock-wool plants in the United States there are only five in Canada, of which the Caledonia, Ontario, wool plant of Gypsum, Lime & Alabastine, Ltd., was the third to be established.

In 1931 M. F. Goudge made a report on *Raw Materials for the Manufacture of Rock Wool in the Niagara Peninsula of Ontario,* which was issued by the Mines Branch of the dominion government and in which he gave the possibilities of making rock wool from deposits of rock in the St. David's-Thorold area. However, at that time laboratory facilities were not available for the actual making of rock wool, aside from a few fibers, and the report was largely based on deductions drawn from a study of the characteristics exhibited by the rock while in a molten state. Later laboratory tests were made possible and these deductions proved by the actual making of rock wool.

In 1936 Gypsum, Lime & Alabastine, Canada, Ltd., concluded that the manufacture of rock wool would fit in with the other products of its Caledonia plant—Gyproc wall-board and the full line of gypsum products, as well as a sideline of Zonolite insulation. Investigation of rock-wool plants in the United States was carried on for some months and in September of its jubilee year the company designed and built a new two-story plant adjacent to the board plant. Constructed of galvanized iron and wood and insulated with rock wool and gypsum wall-board, it is 150 by 50 feet in plan and has concrete floors throughout.

Operations started on a 24-hour basis late in September of that year and a vigorous business has since been developed.

The rock-wool plant at Caledonia uses argillaceous (Rochester) shale, procured from Queenston, Ontario, as a base rock, adding a certain amount of silica rock and limestone, which is a dolomite and high-calcium rock.

Following is the analysis, by weight, of the Queenston rock which is being charged into the furnace:

Silica (SiO_2)	27.92 per cent.
Alumina (Al_2O_3)	11.31 per cent.
Iron Oxide (Fe_2O_3)	2.73 per cent.
Total Lime (CaO)	20.34 per cent.
Magnesia (MgO)	9.25 per cent.
Sulfur Trioxide (SO_3)	.97 per cent.
Ignition loss	27.10 per cent.
Total	99.44 per cent.

Rock of this chemical composition has been declared entirely fit for the making of good wool without admixtures. But this company feels that it makes a better wool by adding other ingredients, and so its raw material falls into the second type of rock deposits mentioned in the Goudge report as suitable for rock-wool manufacture —those that yield a material which, when mixed with material from another deposit, will give a furnace charge of suitable composition.

The dolomite is taken from the company's lime quarry at Hespeler, Ontario. It is highly basic chemically, with a relatively-high percentage of magnesia. Studies have indicated the advantage of a high percentage of magnesia in the rock to increase the fluid-

idity and the viscosity range of the molten rock at temperatures over 2,500 degrees F. Enough Hespeler rock is added to increase the basic constituents of the Queenston rock (CaO and MgO) to approach more closely the SiO_2 and Al_2O_3 content. An approximate balance of acidic and basic constituents results.

The third ingredient, silica rock, is obtained from the Canada Crushed Stone Corporation, Ltd., quarry at Hagersville, Ontario.

The shale and limestone come in by railroad cars and the silica by the company's own truck. One dump truck works all the time and another from the gypsum plant is used when required. The rock is dumped into a 200-ton storage shed adjacent to the charging doors of the furnace, being brought in by truck from the level.

The type of fuel used to fire the cupola is of great importance, inasmuch as it has its effect upon the final rock-wool product. A low ash content is desirable to minimize such materials in the product. Experience has demonstrated that the best results are obtained from a mixture of a hard, long-burned foundry coke with a 9-per cent. ash content.

An average of several tests of the foundry coke used shows the following important characteristics:

Ash	9.25 per cent.
Sulphur	1.00 per cent.
Fusion	2,550 deg. F.
Apparent specific gravity	.86
True specific gravity	1.93
Porosity	55.00

The coke must be of sufficient size, 4 to 6 inches, and have sufficient strength to carry the weight of the rock under heat. Part of the coke comes from the Hamilton Coke Ovens and the remainder from the Semit-Solvay Company, Ltd., Buffalo and Detroit. It is stored under the same roof as the stone, being dumped within a few yards of the firing doors of the furnace.

All the rock and coke is accurately weighed on a Gurney scale before being put in the furnace and after having been subjected to chemical analysis.

The initial operation at the cupola is to place a bed of molders' sand in the furnace bottom, and a 5-foot bed of coke is built up to a point 30 inches above the blast tuyeres. The fire is started from wood, and coke is gradually added until it is built up to the 5-foot depth. The draft is turned on when this coke is burning evenly and the first charge of rock is added. Thereafter alternate charges of coke and rock are added, the charging being so proportioned that all the rock is melted and the coke bed is maintained at the proper height for maximum operating efficiency. About seven layers are required.

The cupola is a 36-inch Standard Whiting. There is a distance of 12 feet from the draw-off to the feed door. The furnace is cooled with a water jacket. The draft is furnished by a fan manufactured by the Canadian Blower & Forge Company, Ltd., and operated at from 700 to 1000 cubic feet per minute. The blasts converge at a central point through seven tuyeres and it is here that melting occurs. The temperature reached is anywhere from 2,800 to 3,500 degrees F. The molten slag trickles down through the coke and is drawn off through an opening at the side of the cupola, issuing in a ½-inch stream. Here it is struck, at approximately a right angle, by steam jets at around 120-pound pressure, which shatter the stream of molten slag into innumerable small globules that are directed into the blow chamber.

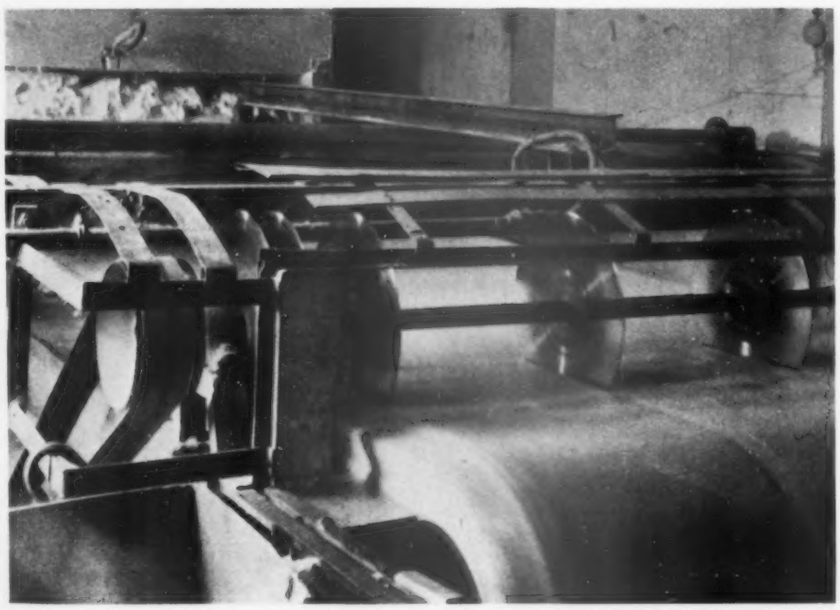
Firing door of the cupola.

The blow chamber is 20 feet high, 6 feet wide and 40 feet long. On the bottom of the blow room is a full-width conveyor of the pan-belt variety made up by the Link-Belt Company, Ltd. to the specifications of Gypsum, Lime & Alabastine, Canada, Ltd. Steam for the steam blast is supplied by a 400-horsepower Erie City boiler. The boiler-room is nearly automatic, only the cinders being removed by hand labor.

As the globules are propelled through the air the fibers form and stream out behind them, solidifying and falling upon the moving floor in a fluffy mass. From this point, they are transported to the wool room. A certain proportion of the glassy globules (shot) is always present in the raw wool.

At the top of the blow chamber there is a Cleveland fly-wool collector, which consists of 13 individually-operated air chambers that catch the fly wool and discharge back to the belt. This fly-wool collector is worked automatically by fans and an automatic device which operates the 13 chambers alternately on set periods of time. These collectors can be installed either to dump the fly wool into the regular wool chamber or into a separate chamber if so desired.

This efficient equipment is the latest improvement to the Caledonia plant having been installed in February. Previous to its installation there was a loss of approximately 10 per cent. on the wool.



A conveyor 7 feet wide carries the wool from the collecting chamber to two sets of circular knives which cut it into batts. It is compressed by a roller on its way to the knives.

The speed at which the wool comes out of the chamber on the belt determines the thickness of the batt. The conveyor travels at an average of from 12 to 15 inches per minute toward its discharge end. The wool is compressed through a roller, and two systems of circular knives, set crosswise and lengthwise, cut it into different-size batts. The lengthwise knives are stationary and the crosswise semi-automatic. It travels from this point on a 20-foot centers Link-Belt belt conveyor, 7 feet wide, to the men who cut off the desired widths and box the batts.

When bulk wool is desired, it is removed from the belt and put into bags. If granulated wool is required, the wool is taken from the belt and is placed in an elevator, which takes it to a conveyor belt, that brings it to the granulating room.

The granulating process employs a distintegrating machine, manufactured by the International Harvester Company, Ltd., which shreds the wool into very small pieces. These are taken up on an elevator to a revolving screen, where the shot is screened out and small pieces of wool formed into balls measuring from ⅛ to ⅜ inch in diameter. The balls are discharged into a small hopper and bagged.

Rock and coke are weighed in wheelbarrows before being charged into the cupola.

In addition to being screened, the granulated wool goes through an air-separator which eliminates any chance of shot or slag remaining in the wool. The wool falls by an air draft which blows the light wool over a partition into a bend, while the slag and shot fall during the operation into a separate container.

This additional air-separator has made it possible to reduce the poundage of wool in bags from 35 to 31, each paper bag containing material to fill a space 15 square feet in area and 4 inches thick.

Granulated wool is used in Canada principally for loose-fill insulation in existing structures, to insulate water heaters or tanks, or wherever loose bulk insulation can be applied.

The batts themselves are 12 to 15 inches by 2 inches and 3¾ inches and

View of the storage department showing the roller conveyor which carries the boxes away.

are put up in bags. Each bag contains twelve 3¾-inch batts or twenty 2-inch battets. Each battet is separated by a thin sheet of paper from its neighbors so as to keep them intact.

The same size is also made in paper-backed battets, which are used where moisture-proof backing is desired. The paper backs consist of two thin layers, between which is a layer of asphalt, and they have two flanges, 1½ inches wide, which are available for nailing to the side of the studding, and one flap, 2 inches long, which fits over the next battet, thus making a moisture-proof joint.

This overlapping principle for each individual battet, which excludes any possibility of moisture-laden air traveling through the joints, is a distinctive development of the Caledonia plant, which is the only rock-wool plant in Canada putting out this type of backing with lapped joints.

The next size batt is 15 by 24 inches in size. These are put up in cartons which contain 18 2-inch, covering an area of 43 square feet, or 10 3¾-inch, covering an area of 24 square feet.

Enough storage is provided at the rock-wool plant at Caledonia to take care of three weeks' run, or 25 cars; but the demand has not permitted any stock-piling and has taxed the limits of the plant. Approximately a carload of wool is produced each day and 25 men, working in 8-hour shifts, are required to operate the plant.

The Gyproc wool is shipped by trucks and railroad. The plant has a railroad siding on each side.

An important factor in the cost of rock wool is the fact that 36-foot box-cars can accommodate only 10 tons of wool. This is the limit that can be packed in the car and a 40-foot box-car can take only 12 tons. Naturally this adds to the price of the product, which is always sold at delivered prices. All wool is sold f.o.b. destination by the 1,000 square feet in the thickness required. Thickness determines the price.

The green-stripe trademark of the famous Gyproc products of Gypsum, Lime & Alabastine, Canada, Ltd. is used on all products and packages from the wool plant.

There is a very well organized safety-first system in the plant. Twenty-six men were trained and placed on the St. John Ambulance Corps in 1938, as compared with only three in 1937, making a corps of 29 all told. There is a safety-first committee, composed of all the foremen and the representatives of the workmen, which meets every month. Up to the time of writing the plant had operated for 160 days without one lost-time accident.

The general superintendent of the gypsum plants of Gypsum, Lime & Alabastine, Canada, Ltd. is also superintendent of the Gyproc wool plant at Caledonia. He is L. V. Robinson, who came to Canada in 1920 from the United States Gypsum Company.

L. C. Watson is chief chemist and R. Y. Hudspeth is in charge of plant quality. It might be said here that there is said to be closer chemical control at the Gyproc plant than in any

(Continued on page 44)

Batts are cut to proper size by workmen stationed at the end of the conveyor.

By HARRY F. UTLEY

River Operator Improves Storage and Handling Facilities at Shore Plant

A view of the yard at Owensboro showing the new all-steel conveying system for sand.

ON the Kentucky side of the Ohio River, at Owensboro, the River Sand & Gravel Company stores and loads out the material taken from the bed of the river by its dredge, the *W. L. Faith, Jr.* The company has operated at this site for nearly a quarter of a century, its dredging equipment roaming up and down stream as far as 20 miles in search of suitable material.

Improvements in operating methods and equipment to aid efficiency and reduce costs have been made from time to time by the management. This year two Marietta concrete-stave storage silos were erected at the shore plant to save the rehandling costs of stored gravel, an all-steel conveying system was erected to replace an old wooden structure, and an Eagle "Swintek" screen-nozzle ladder was installed on the dredge suction line to speed up production and eliminate delays caused by clogged intake and pipe-lines.

A 10-inch Holtz centrifugal pump dredges the material, the sizing being accomplished by three revolving screens, a single-deck Simplicity vibrating screen, and a stationary screen for sand.

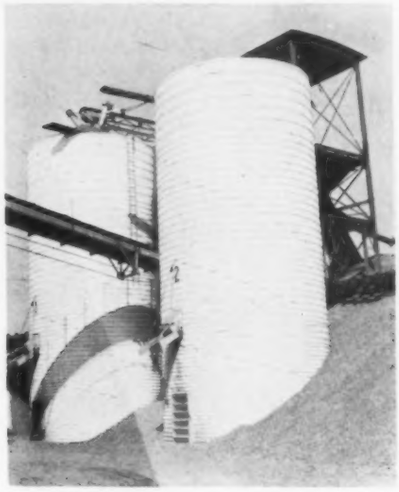
Seven steel barges, each 100 feet long, 26 feet wide and 6½ feet deep, are used to bring the gravel and sand into port. These are drawn by the twin-screw towboat *Pat Yager,* powered by a 240-horsepower Fairbanks-Morse Diesel engine. The maximum size material used commercially is 1½ inches. None is crushed.

Tied up at the dock, the barges are unloaded by a Wiley Whirley electrically-driven crane which has an 85-foot boom and a 1½-cubic yard clam-shell bucket. The crane operates on standard-gage rails spaced 15 feet apart on a concrete pier extending a short distance into the water. The bucket may discharge to a Butler steel loading hopper which feeds a 200-foot conveyor running up to the top of the distributing structure, or to a Butler two-compartment bin which loads motor trucks through a hopper gate at the bottom without further rehandling of the material.

Sand or gravel coming up the 20-inch, 200-foot Robins belt-conveyor is discharged into a hopper at the top of the incline, gravel being carried off to open storage at right angles in two directions by cable-controlled dump cars operating on trestles, or diverted to the two new Marietta silos by a 20-foot Barber-Greene pivoted belt-conveyor. These silos, each 18 feet in diameter and 40 feet high, have a capacity of 350 tons each and are equipped with chutes near their bottoms for loading trucks. The management is well pleased with the silo-storage method, because it eliminates much of the waste and expensive rehandling of material necessary with open storage, and more are to be erected in the future, eventually doing away with open storage entirely.

Sand coming up the plant conveyor is fed to the new all-steel Robins conveying system arranged in line with the plant conveyor. This consists of an 18-inch main belt on 160-foot centers which serves a 50-foot shuttle conveyor and tripper, also equipped with an 18-inch belt, for distributing the sand to its proper storage pile.

Material in open storage is loaded into delivery trucks by Barber-Greene loaders. There are four of these units in service about the yard.



The concrete-stave bins recently erected to store gravel.

The distributing tower as seen from the truck-loading bin.

Loading hopper which feeds plant conveyor and, behind, the truck-loading bin.

Each outgoing load is weighed and recorded at the plant office, located in an adjoining brick building, by a Howe Weightograph truck scale.

The plant has a capacity of about 100,000 tons annually and much of its present output is being taken by the Kentucky State Highway Department and by several large PWA projects underway in the vicinity, including the new highway bridge over the Ohio River now under construction. The bridge will for the first time make Owensboro independent of ferry service, since the span will connect Ken-

Bucket loaders which serve delivery trucks from open storage.

tucky Highways Numbers 54, 71 and 75 converging at Owensboro with relocated Indiana Highway Number 66. The company also supplies all the aggregates used at the new ready-mixed-concrete plant of the Transit-Mix Concrete Company located about a mile away.

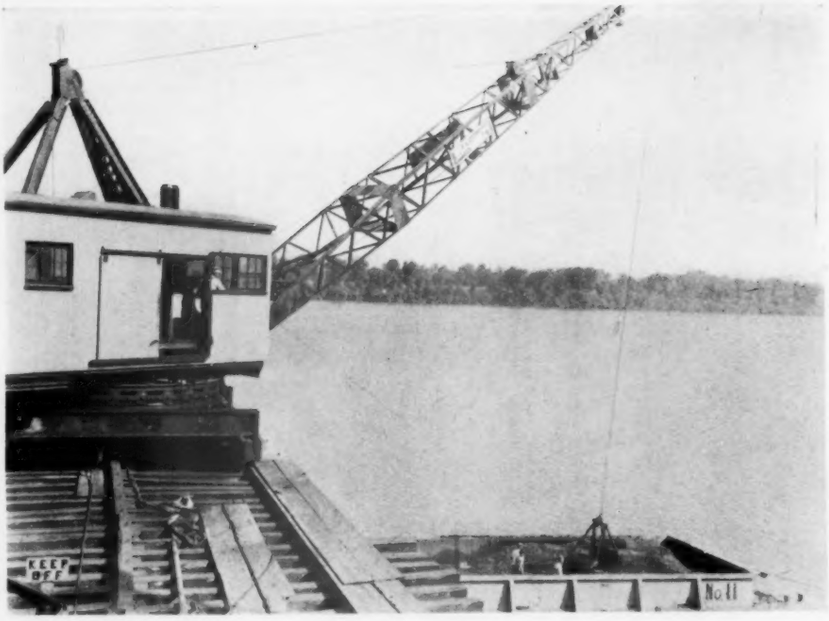
The new silos were installed in May of this year by the Marietta Concrete Corporation of Marion, Ohio. The conveyor installation was designed and erected by the Church Engineering Company of Cincinnati.

P. A. Yager is president and general manager of the River Sand & Gravel Company and John Overton is chief engineer. The office and shore plant are located at 701 East Second Street.

Bohm Designs All-Steel Spreader Device Joists

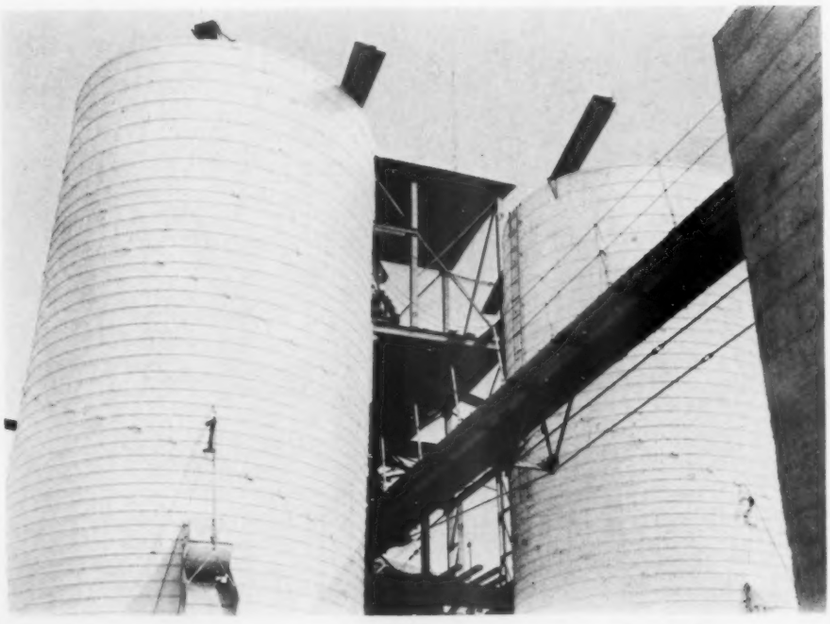
To reduce forming costs in building concrete floors with precast concrete joists, Paul Bohm of the Concrete Products Corporation, South Bend, Indiana, has invented and patented a steel spreader which does away with the conventional wooden spreaders and wire hangers.

The device will be marketed by the C-B Joist Spreader Company of South Bend.



Revolving crane unloading Barge Number 11 at the dock.

Diesel-powered towboat bringing in three loaded barges. New highway bridge over the river under construction in distance.



Another view of the silos with sand conveyor operating between them.

Labor Requirements in the Production and Distribution of Sand and Gravel

ANALYSIS by the Bureau of Labor Statistics of the records of 24 sand-and-gravel plants indicated that the amount of labor required in production varied widely according to the type of operation.[1] The production and distribution of 100 tons of sand and gravel required 94.5 man-hours of labor. Of this, production labor took 32.8 per cent., fuel and power 1.7 per cent., and transportation 65.5 per cent.

The production-labor requirements in dry-pit and wet-pit operations were about the same, requiring 25.4 and 26.3 man-hours for 100 tons. Marine processing required nearly twice as much production labor—41.2 hours where the processing was done on the dredge and 57.9 hours where it was done on land.

As companion materials to cement in concrete, sand and gravel find an ever-widening use in architectural and engineering developments such as building construction, river, harbor, and flood-control work, water and sewerage projects, reclamation work, and highway construction. In building construction sands are also used for masonry mortar and for plastering of all kinds. For highway building, other than concrete, sand and gravel are used in bituminous and traffic-bound road construction. Considerable quantities of gravel are also required for railway ballast.

The industry is characteristically a local one and the deposits are widely distributed throughout the United States. Because of the low value of the product as well as its weight and bulk, transportation costs narrow the consuming market to areas adjacent to producing centers. As a result, the industry includes a great number of operators ranging from the small part-time or portable-plant producer with an annual output of a few thousand tons to the large-scale and highly-mechanized establishment producing more than a million tons yearly.

The deposits studied are of the bank, pit, and marine types. A bank deposit is one in which the elevation of the excavation floor is level with or above the surrounding land surface. A pit deposit is one lying wholly below the surrounding land surface; but pit deposits are also divided into dry pit (in which the exacavation floor is above the level of permanent ground water) and wet pits (in which the excavation floor is below the water level). Marine deposits are those forming the bed, bars, or small islands between the banks of a natural body of water.

Methods of production depend on the character and location of the deposit, its output and capacity, and whether or not the material needs subsequent treatment. In the early days of the industry, little or no processing was required. To-day, however, practically all plants wash, screen, and size their products, and numerous establishments equip their plants with elaborate machinery for classification and purification in order to adhere to the rigid specifications, pertaining to size and quality, demanded by modern construction practice.

Production-Labor Requirements.—Weighted-average labor requirements in the establishments covered by the bureau's survey were lowest in dry-pit plants, where 25.4 man-hours were needed in the production of 100 tons of sand and gravel, and were highest in marine operations where the processing was done on land, requiring 57.9 man-hours. In the data presented in Table I, "Dredging or Excavation" includes the labor required in the moving and disposing of the overburden (when necessary) and the labor involved in the operation of the excavation equipment. It covers the time needed to load the excavated material into cars, barges, or other haulage units and to transport and unload it at the processing plant or distribution yard, as well as the labor involved in changing and shifting railroad tracks in land plants.

Plant Variations in Labor Requirements.—The different types of deposits in the industry present diversified problems of operation and result in large variations in labor requirements. The number of man-hours among the individual plants included in the several types of operation also show wide differences. The importance of transportation costs in the delivered price of the product affords a partial explanation of these variations. High-cost plants are often able to supply the demands of sizable local markets because the expenses of transportation restrict shipments from lower-cost producers in other areas. The length of time a deposit has been worked is another factor in the range in man-hours. In land operations, for example, as excavation continues, pit costs are likely to be higher and the length of haul to the processing plant increased. Marketable material in marine operations after prolonged periods of dredging may be obtained only at greater distances from the plant or distribution yard. Differences in the size of plants, annual output, and type of equipment cause variations in labor requirements. The modern sand-and-gravel plant has machinery and equipment capable of producing tonnage far in excess of present demands and, normally, man-hours per ton are reduced as the rate of operation increases.

The range in total production-labor requirements in the individual plants using the various types of operation was as follows:

	Man-hours per 100 Tons
Dry-pit plants	20.0 to 47.7
Wet-pit plants	18.8 to 38.5
Marine plants:	
Processing on dredge	38.1 to 47.8
Processing on land	36.0 to 81.2

[1] [The detailed report was published as Serial No. R. 944.—Ed.]

TABLE I.—MAN-HOURS REQUIRED PER 100 TONS IN THE PRODUCTION OF SAND AND GRAVEL, BY TYPE OF OPERATION, 1937

Type of Operation	Number of Plants	Output (tons)	Total		Dredging or Excavation[1]		Plant Operations		Repairs and Maintenance		Overhead, Sales and Supervision	
			Man-hours per 100 Tons	Percentage	Man-hours per 100 Tons	Percentage of Total	Man-hours per 100 Tons	Percentage of Total	Man-hours per 100 Tons	Percentage of Total	Man-hours per 100 Tons	Percentage of Total
Dry-pit	11	3,173,000	25.4	100.0	5.4	21.2	11.1	43.7	4.9	19.3	4.0	15.8
Wet-pit	6	2,400,000	26.3	100.0	2.9	11.0	9.3	35.4	8.1	30.8	6.0	22.8
Marine:												
Processing on dredge	4	2,435,000	41.2	100.0	21.0	50.9	11.7	28.4	2.7	6.6	5.8	14.1
Processing on land	3	863,000	57.9	100.0	17.3	29.9	19.6	33.8	14.8	25.6	6.2	10.

[1] Includes man-hours required for stripping when necessary and hours required for transportation from point of excavation to processing plant or distribution yard.

Total Man-Hour Requirements.—Other costs entering into the final cost of producing and distributing 100 tons of sand and gravel are the fuel and power used, and the cost of delivery to the site of construction.

Inasmuch as the production of sand and gravel is an extractive industry, no raw materials are required in production. However, during the process of production the industry consumes substantial quantities of fuel and power, including electrical energy purchased or manufactured, coal, fuel oil, gas, and gasoline. Supplies, such as lumber and timber products, wire screen, belting, rope, iron and steel products, lubricants, and explosives, are also required for plant operation, repairs and improvements. It was not found feasible to estimate the employment created in the production and distribution of these supplies, because of the irregularity of purchases by individual firms and because of the difficulty of determining quantities of materials used for operating purposes. Nor was it practicable to estimate employment created by the depreciation of plant, equipment, and machinery.

Fuel and power are required to operate the stripping and excavating equipment, to transport the material to the plant, and for plant operations and processing. In individual establishments little uniformity exists in the kind of fuel used in operations. The determination of the most suitable type of fuel is dependent upon the location of the plant, the type of operation, and the kind of equipment. Numerous marine plants use coal for the operation of their dredges; other firms have Diesel-electric dredges consuming fuel oil. In land plants electrical energy may be either purchased or manufactured. The equipment for transporting the material from the pit to the plant in land plants may be run by gasoline, oil, or coal power.

The Census of Mines and Quarries for 1929 is the only available source showing the total consumption of fuel and electric power in sand-and-gravel plants. A summary indicating the number of tons produced by firms in 1929 and the quantities of fuel consumed in production is presented in that census. Converting all fuels, with the exception of electrical energy generated by the reporting enterprises, to an equivalent bituminous-coal tonnage on the basis of heat units, it was ascertained that in the production of 100 tons of sand and gravel the fuel and power consumption was equivalent to 0.536 ton of bituminous coal. According to records of the National Bituminous Coal Commission, the labor necessary in mining a ton of bituminous coal in 1936 amounted to 1.52 hours per ton. A previous study by the Bureau of Labor Statistics showed that 1.529 hours were needed in the average haul to transport 1 ton of bituminous coal by railway. Consequently, the labor required in mining and shipping a ton of bituminous coal amounted to 3.0 hours. Thus, the 0.536 ton of coal estimated to have been consumed in the production of 100 tons of sand and gravel required 1.6 hours of labor in mining and transportation.

Average labor requirements in production for the sand-and-gravel plants covered by the study and the estimate of man-hours involved in mining and transporting the fuel consumed in operations totaled 32.6 hours per 100 tons. In placing sand and gravel at the site of construction the major labor requirements, however, are those involved in delivery from the point of production to the job site. Delivery to the site may be effected by waterway, railway or highway.

Delivery to the site originating by truck required 44.1 hours per 100 tons; by railway with truck delivery from the railway siding to the site 73.4 hours; and by waterway with haulage by truck from the dock to the job 73.5 hours. The Bureau of Mines Mineral Yearbook, 1938, indicates that for 85.9 per cent. of the total tonnage of sand and gravel sold or used by commercial producers in 1937, 39.3 per cent. was shipped by truck, 47.4 per cent. by railway, and 13.3 per cent. by waterway. A weighted average of the three methods of transportation based on the percentage of the total product hauled by each showed that 61.9 hours of labor was required in delivering 100 tons of sand and gravel to the construction job. With production labor and fuel consumption accounting for 32.6 hours, the production and distribution of 100 tons of sand and gravel required an average of 94.5 hours.

Application to Federal Construction Projects.—On the basis of the labor required in 1937, it is estimated that 178,000,000 man-hours of labor was involved away from the site of construction in the production and distribution of $283,000,000 worth of sand and gravel used on the Federal construction program from January, 1935 to March, 1939. This is equivalent to furnishing full-time employment to approximately 89,000 men for 1 year on the basis of 2,000 hours per year. Nearly 105,000,000 tons of sand and gravel is estimated to have been used on Public Works Administration projects alone from July, 1933 to March, 1939. The production and distribution of this tonnage required nearly 99,000,000 man-hours of labor.

Labor in excavation, plant transportation, processing, overhead, and repairs represented 32.8 per cent. of the total indirect labor; fuel and power requirements were 1.7 per cent; and the transportation of sand and gravel from the plant to the site of construction amounted to 65.5 per cent. of the total hours.

Summarizing, it appears that the production and distribution of 100 tons of sand and gravel required a total of 94.5 man-hours, distributed among the various items as follows:

	Man-hours per 100 Tons
Production labor (all types of operation)	31.0[1]
Dry-pit operation	25.4
Wet-pit operation	26.3
Marine operation:	
Processing on dredge	41.2
Processing on land	57.9
Fuel and power	1.6
Haulage to construction site	61.9
Total labor requirements	94.5

[1]Average weighted according to percentage of total output produced by each type of operation: Bank and dry-pit plants, 49 per cent., wet-pit plants, 25 per cent., and marine plants, 26 per cent.

Honolulu Lime Plant Buys Brick Machinery

The Hawaiian Gas Products Company of Honolulu has purchased from Murray W. Cox, Congress Hotel, Chicago, a 16-mold rotary sand-lime-brick press, a pug-mill, an automatic scale, 60 brick cars, two 56-foot hardening cylinders and miscellaneous equipment to be installed in conjunction with its new lime plant in Honolulu, T. H. This new plant, upon completion, will manufacture bricks made from volcanic-ash and lime.

Before the company decided to embark on this new venture, it made an exhaustive study of the kind of brick this material would make. Several tons of the volcanic ash and lime were shipped from the islands to the plant of the El Paso Building Material Company at El Paso, Texas, where many tests of the product were made. Excellent results were obtained and a very fine brick was produced. The El Paso concern has had a great deal of experience in the manufacture of a similar product. It has for many years been producing bricks made from cinders and clinkers. The sale of the machinery to the Honolulu firm was made through the Fernholtz Machinery Company, Los Angeles.

The South Dakota state-owned cement plant recently paid $100,000 into the general fund of the state. The payment was the first ever made since the plant started operating a score of years ago.

By W. E. TRAUFFER

PROCESSES KAOLIN BY FOREIGN METHOD

Shovel loading clay into hopper over belt-conveyor in pit.

The plant at Spruce Pine. Note the immense window areas.

Loading overburden into one of the four-wheel-drive trucks.

CONSIDERABLE time and money have been expended in this country in attempts to locate and develop deposits of high-grade ceramic clay to take the place of clays now imported from Europe. England and Czecho-Slovakia have been the chief sources of this material. In 1930 a deposit in North Carolina, which was brought to the attention of H. C. Marmon, formerly president of the Marmon Motor Company, appeared to have possibilities. This deposit was thoroughly investigated for over 4½ years, during which time nearly 2,000 test holes were drilled to a depth of more than 80 feet without finding the bottom of the clay. About 50 shafts and pits were dug and numerous tunnels, from 110 to 390 feet in length, were driven into the deposit.

Assured of an almost inexhaustible supply of high-grade ceramic kaolin, the next step was the construction of a plant capable of turning out a high-grade clay under close control. In order to achieve these ends Kaolin, Inc. adapted European methods to this local raw material. The plant was designed jointly by the Zettlitz Company, a leading Czecho-Slovakian clay producer, and the H. K. Ferguson Company. It went into operation in May, 1937.

This plant is located about 4 miles east of Spruce Pine, North Carolina, in an area noted for its scenery and mica and feldspar production. The deposit is said to have originated in the decomposition of pegmatite—an agglomeration of feldspar, quartz, mica, garnet and traces of other minerals—by the action of ground water and carbonic acid. According to Dr. Michler of the Zettlitz Company, "Erosion unburdened the original rock, a Cambrian schist, and cut deep gorges. The magna pushed up and raised part of the superimposed schist. Partly it ran over and spread, so that a cross section would look like a mushroom. Lacolythe is the proper name."

The overburden on this deposit averages from 15 to 20 feet in thickness and consists of red clay and humus, which are removed during periods when no kaolin is being dug. The same Austin ½-cubic yard shovel is used for both operations. Two Marmon-Herrington four-wheel-drive trucks are used to haul away the overburden. They are able to operate under the worst conditions and successfully climb steep grades with their loads of 4 to 5 tons. They are also used for general hauling about the plant.

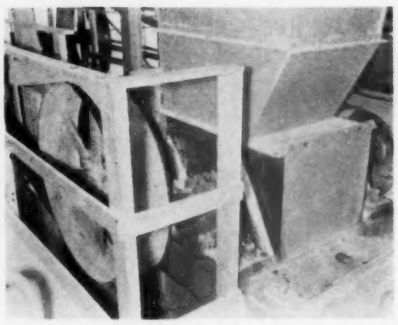
While the deposit is practically uniform, there are some discolorations, so shovel loading is supplemented by hand selection. By prospecting a year in advance the mine and laboratory determine a key by which the mine is worked so as to obtain the desired blend of material.

The Austin ½-cubic yard shovel loads the clay on a belt-conveyor to the plant. A Bartlett and Snow double-roll crusher is used to break the lumps of clay to ½-inch to 1-inch maximum size. The two rolls revolve at different speeds, the larger being the smooth conveyor roll. The smaller roll revolves more rapidly and has 12 small manganese-steel blades. At times the clay runs finer and disintegrates readily and the rolls are then by-passed. A grizzly at the feed end of the pit conveyor is then used to remove occasional large pieces.

The five revolving screens. The vibrating screen in the foreground supplements these.

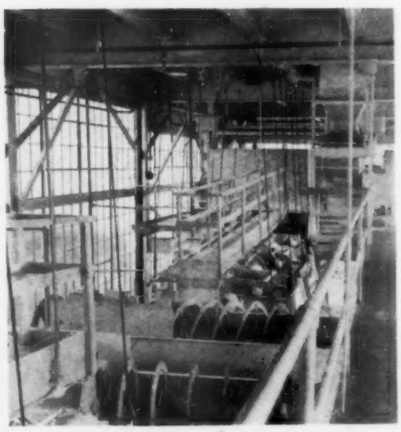
Two belt-conveyors feed the clay into two bins, which hold enough material for several hours' operation of the mill. The flows from these two bins are identical. The clay is discharged from each bin into a blunger which is a 25-foot by 25-foot steel tank, having the material feed and overflow on one side and the clay slip, sand and rock discharge on the other. In this way the clear water, to which sodium carbonate has been added as an electrolyte, comes in contact with the nearly-clean sand at the discharge point. Three shafts with knife blades operate counter to the water flow. The slip takes an hour to travel through the blunger and the sand is so thoroughly washed that it will not leave a stain when held in the hand.

Blending and storage tanks with some of the filter presses in foreground.



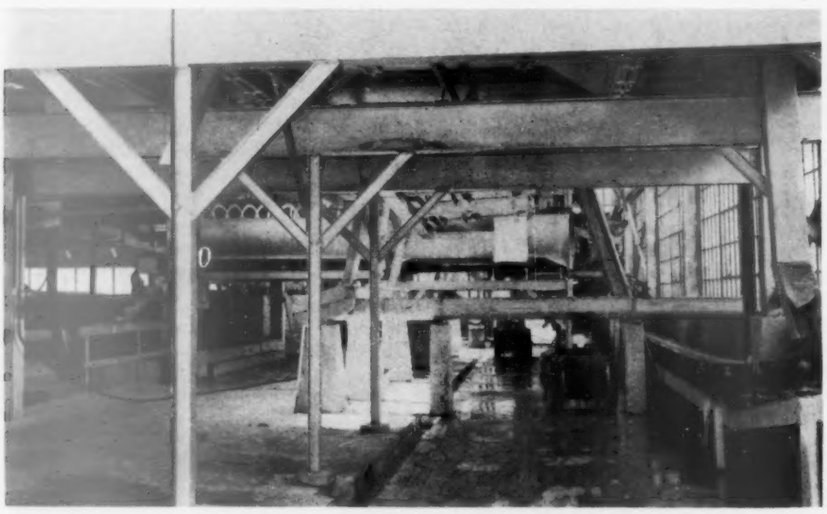
Roll-crusher where the first step in processing takes place.

The coarse sand and small particles of rock, principally quartz and partly decomposed feldspar, are discharged from both blungers on a belt-conveyor leading to the waste dumps. Everything carried in the overflow goes to two pairs of Tyler Niagara 1-deck vibrating screens with 50- to 60-mesh Tyler stainless-steel cloth. These screens retain most of the mica, which is a salable by-product. Screw-conveyors carry the mica to a separate plant for further treatment. About 20 tons of mica is produced in 24 hours.



Sand washers, blunger, and the four vibrating screens.

The clay slip is then passed in a slow stream through two shallow tanks in which the remaining sand and mica settle out to waste. The clay slip has now lost most of the impurities which are mechanically separable. The slip is next passed through two settling tanks 35 feet long with ribbon-type conveyor screws. The slip passes through these tanks in ½ hour and is then distributed into five concrete sand-boxes.



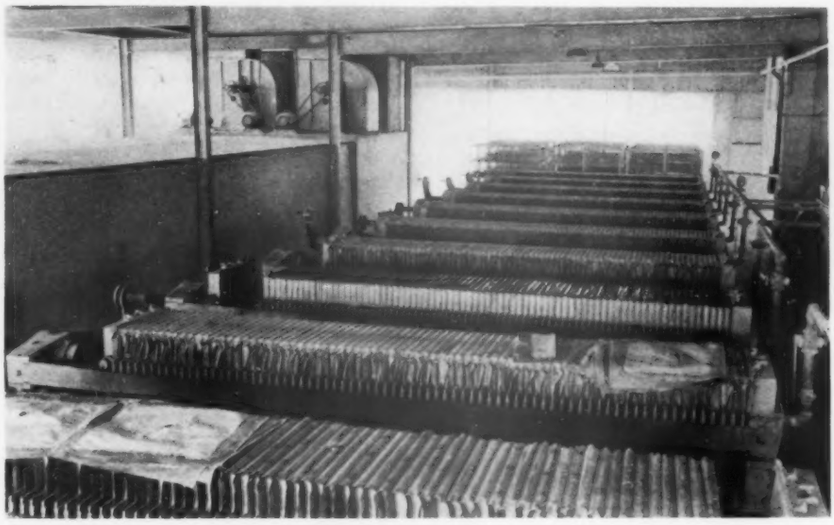
View showing screw-conveyors, sand washers and belt-conveyors.

These feed by gravity five 4-foot diameter Mueller revolving screens with 200-mesh wire cloth, which remove any floating impurities, most of these having been retained by swimmers in the sand-boxes. These boxes are cleaned out when the settlings reach a certain height.

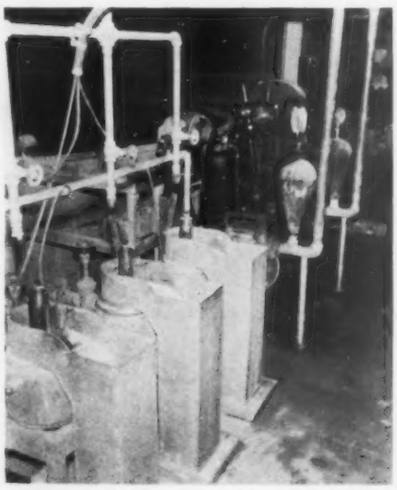
The aim up to this point is to insure the proper functioning of Stoke's law. Checks are made every half hour to insure a constant specific gravity, constant rate of flow, etc. The drop in density from the feed end to the discharge end is recorded and controlled and the flow measured. Any necessary adjustments are made by controlling the feed to the blungers and adjusting the feed of electrolyte or water.

The clay slip passing through the screens has a very low specific gravity and is thickened in eight wooden tanks each 27 feet in diameter and 16 feet high. Alum is added as a settling agent and the clear water is then decanted. The heavy slip is discharged into three mixing tanks. Each of these is 27 feet in diameter and 9 feet high and together the three tanks hold a week's production. The second mixing is done by means of three Goulds centrifugal pumps, each of which draws from the bottom and discharges back into the top of one tank. About 30 minutes' time is required to recirculate all the material in each tank, about 40,000 gallons. If desired, these pumps can also be used to feed from one tank to another. The discharge pipe is set at an angle so that the slip is further mixed by rotation inside the tank.

After the contents of a tank have been completely recirculated the same pump feeds them by means of a valve in the return line to a Frantz Ferro magnetic filter or separator. The separator products are discharged into a sump from which diaphragm pumps feed the final slip into the filter presses.



Some of the filter presses. Tunnel drier is at the left.

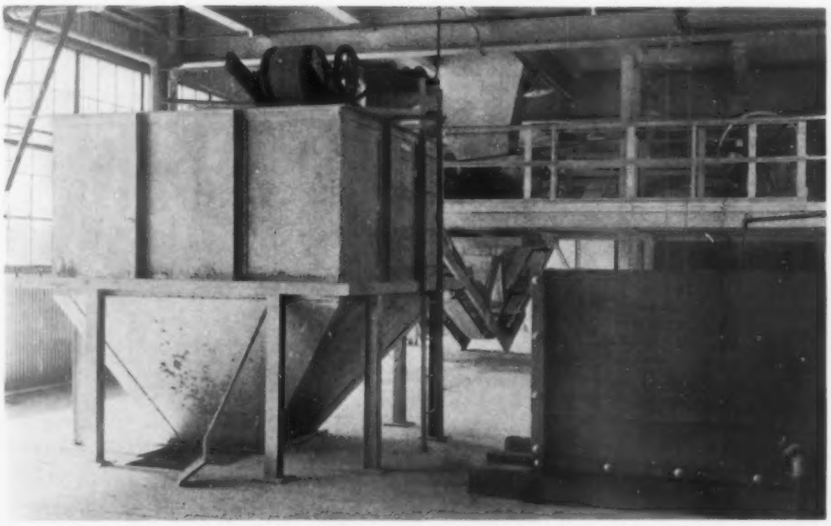


Magnetic separators with one of the diaphragm pumps in background.

Dried cakes ready to be conveyed to warehouse.

This slip has a moisture content of 70 to 75 per cent. and contains about 300 grams of solids per liter. The twelve Crosley filter presses produce cakes containing from 30 to 33 per cent. moisture.

The filter cakes are set on wooden racks on cars which are pushed automatically through two 90-foot tunnel driers. In these driers fans blow air over steam coils in a direction opposite to that in which the cars are moving so that the driest air hits the driest clay. A thermostatic control insures that the critical temperature of 230 degrees F. is not exceeded. Ample kiln capacity makes it possible to dry at a temperature of 160 degrees F. in a cycle of 24 hours synchronized with the output of the presses. With this system calcination is impossible. After the drying has brought the moisture content down to less than 5 per cent. the cars are taken from the driers and the cakes removed from the racks to screw- and belt-conveyors feeding a 1,500-ton storage bin. The third and final mixing is obtained in feeding the cakes into this bin and



Conveyors which distribute materials from roll-crusher to blunger feed bins.

withdrawing them for shipment. About 99 per cent. of the output is shipped in bulk in box-cars. Some less-than-carload shipments are bagged by hand.

The plant has a capacity of 400 tons of crude clay in three 8-hour shifts. The production of washed clay varies from 60 to 70 tons, depending on the yield of the raw material. The product is known as "Kamec" kaolin and is shipped to all parts of the country for the manufacture of china, pottery

One of the all-wheel-drive trucks.

wares, sanitary porcelain, high-tension insulators, etc. Tests are being conducted to determine the possibility of using this material for other purposes, such as activation, the manufacture of dyes, rubber, paper, etc.

This clay, in ceramic terminology, is "short" and is mixed with ball clays in various proportions. For the best grades of china from 28 to 30 per cent. of Kamec is used and for the cheaper grades from 10 to 15 per cent. Due to its low iron content, amounting to less than ½ per cent., it has excellent casting qualities and good fired color.

A well-equipped laboratory is maintained to make routine tests on physical properties, viscosity, strength and grain size. Chemical analyses are made frequently and iron analyses are run daily. The operations are notable for their cleanliness. Any possibility of contaminating rust is eliminated by the use of copper or brass pipes from the settling tanks on.

Rock Wool (*from page 36*)

other rock-wool plant in the Dominion.

It is an interesting fact that this one of the only five Canadian rock-wool plants has been established in the town that 43 years ago blew wool. This was done in an old foundry on the banks of the Grand River that runs through the center of Caledonia. Shale was dug up from the river bed and the product was chiefly used for insulating water pipes. The factory was never of more than local importance and only operated for a few years.

Gypsum, Lime & Alabastine, Canada, Ltd. was incorporated in 1886 and in April of that year the original property was purchased at Paris, Ontario, where the headquarters now are. The original business was expanded until now plants are operated from the Atlantic to the Pacific across the Dominion of Canada, and trade in its products extends around the globe. The plant in England, already enlarged since it started more than two years ago, is running to capacity.

George A. Dobbie of Galt, Ontario, is president of the company and Col. the Hon. Harry Cockshutt, former lieutenant-governor of Ontario, is chairman of the board of directors.

Watch Out for This Forged-Check Artist

Several contractors, machinery manufacturers and dealers have within recent months been imposed upon by a man who represents himself as Robert S. (Bob) Montgomery. He poses as a prospective purchaser of equipment and then on various pretexts asks to have checks cashed. These range in amount from $15 to $150.

Mr. Montgomery made application to the Morrison-Knudsen Company, Inc., general contrator at Boise, Idaho, for employment as an engineer, claiming to have been employed in an executive capacity with the army engineers at Bonneville. Denied employment, he moved eastward and told the same company's superintendent at North Platte, Nebraska that he had been employed by the Bonneville office and sent out to work. The superintendent refused to employ the man without instructions from his home office but, as Mr. Montgomery claimed to be in financial difficulties, gave him a few days work as a laborer and truck driver. With the truck-driver's license obtained in the course of this employment he proceeded eastward, doubtless using the license as evidence of his employment. He next appeared at the same company's operation at Little Falls, New York and attempted to obtain employment there, and advances and endorsements on personal checks. He claimed to be an old acquaintance of Mr. and Mrs. Morrison and other people in the organization. He succeeded in cashing a check at the Little Falls hotel and subsequently presented himself to various equipment dealers, representing himself as a buyer for the Morrison-Knudsen company. He negotiated orders and obtained money in the form of loans and through the cashing of checks.

Through police coöperation he has been traced through New York City into Ohio at Cleveland and Ravenna, into Chicago, into Detroit, into Canada and again into New York City. He operates by telling a few credible stories about his business connections and almost immediately attempts to obtain money. If he is put off for a few hours on the plea that he must be properly identified, he does not return. So far he has managed to keep a few steps ahead of the police. Most of his victims are prepared to issue warrants for his arrest if he can be apprehended.

Mr. Montgomery appears to be between 32 to 35 years of age. His height is from 5 feet 6 inches to 5 feet 8 inches and his weight is between 150 and 160 pounds. His complexion is rather dark tan. His head is squarish and his jaw square. Directly under the point of his chin there is a small scar, ½ to 1 inch in length, and behind his right elbow a large scar 4 inches in length. He is educated and uses good English and quotes poetry with facility. He has a baritone voice. He claims to be a graduate of the Massachusetts Institute of Technology (M.I.T. or Boston Tech), and is a braggart in other ways. If a man answering this description presents himself he should be detained on some plausible pretext until the police can be notified. Any information concerning this man or experience with him sent to PIT AND QUARRY will be forwarded to the proper persons.

Molding-Sand Deposits Found in Illinois

Promising deposits of fine-grained molding sands, similar to high grade commercial sands produced in other states, have been located in northern Illinois as a result of recent investigations by the Geological Survey Division of the State Department of Registration and Education.

Fifteen deposits, in Whiteside, Jo Daviess, Mason, Henry, Rock Island, Carroll, and Cook counties, are especially recommended as deserving detailed prospecting and testing. Locations and descriptions of the deposits are included with other pertinent information in *Report of Investigations No. 57—Fine-Grained Molding Sand Resources of Northern Illinois,* prepared by the State Geological Survey, Urbana.

The report indicates that there would be an economic advantage in developing sand deposits in northern Illinois as a source of molding sand for use in the industrial area in and near Chicago, where numerous foundries that produce castings of aluminum, brass, bronze, malleable and gray iron are at the present time using considerable tonnages of special molding sands shipped from much more remote points.

The Macco Construction Company of Clearwater, California has purchased the plant of the Glen City Rock Company at Santa Paula and is continuing its operation.

Jack Proton is the new superintendent.

By DONALD CAMERON
Works Progress Administration

Employment Declines Though Output Gains in Crushed-Stone Industry

A RECENT study of the crushed-stone industry shows that technological advances have so increased productivity that 33,000 men employed in 1936 were able to produce a greater output than was produced by 67,000 men in 1913, and indicates that the spread of technological improvements in the industry promises to reduce employment still further.

The report of the survey, prepared by the National Research Project of the Works Progress Administration, is published as a pamphlet of 169 pages entitled *Changes in Technology and Labor Requirements in the Crushed-Stone Industry*. Well illustrated, and containing many tables, the report gives a complete description of the technological advances in the industry, embracing practically every operation. It was prepared by Harry S. Kantor and Geoff A. Saeger of the National Research Project under the supervision of O. E. Kiessling, chief economist of the Mineral Production and Economics Division of the Bureau of Mines.

After noting that in 1913 the industry's total output was 80,000,000 tons and that the number of men employed in that year has never been equalled since, Assistant Administrator Corrington Gill, in charge of all W.P.A. research, wrote in his letter of transmittal:

"The great gains in productivity—from 0.49 ton per man-hour in 1913 to 1.38 tons in 1929—brought about a drop of one third in the number of men employed despite a two-thirds increase in the industry's production. In 1936 the output per man-hour reached an average of 1.85 tons. In that year only 33,000 men, working on the average three-fourths as many hours per year as in 1929, produced 93,000,000 tons at commercial crushed-stone operations."

With respect to future employment prospects, Mr. Gill added:

"Even if commercial output five years from now reaches its 1929 total of 132,000,000 tons, the industry is likely to employ 19,000 fewer men than in 1929 to produce that tonnage at an estimated average of 2½ tons per man-hour. If in five years production is no greater than in 1936, there probably will be a much smaller gain in productivity, but the number of men employed is likely to be considerably below the 33,000 who worked in the industry in 1936. The prospects for new jobs or reëmployment in the commercial crushed-stone industry in the near future are therefore slight."

The report lists the principal states producing commercial tonnage as Pennsylvania, Michigan, Ohio, New York, Illinois, California, Virginia, Indiana, West Virginia and Iowa. Observing that the products of the crushed-stone industry are of outstanding importance in several large branches of the economic system, the report commented:

"Crushed-stone for use as furnace flux is one of the three basic raw materials of the iron-and-steel industry; it is one of the chief materials used in the construction and maintenance of highways and railway roadbed and in various other types of construction. Agricultural limestone constitutes a large part of total tonnage of soil rebuilding materials produced in the United States. Other important outlets for crushed-stone are the chemical industries, glass manufacture and sugar refining."

The study showed, the report said, that a slight increase in the demand for crushed-stone might be anticipated in consequence of several favorable but minor factors.

"For the railroads," the report observed, "cost reductions, freight-rate adjustments, financial reorganization, or the official approval of consolidation would stimulate increased outlay on ballast. Railway expenditures on ballast in 1936 and 1937 were about half these in 1929 and were probably reduced still further in 1938. Under favorable circumstances more than normal requirements may be used at first to make up for the deferrals common in the past few years, unless consolidation reduces the total mileage of track

"The augmented naval-building program will add a little to the sales of fluxing stone for steel production. Activities of the Federal Housing Administration and the United States Housing Authority will account for some rise in crushed-stone production. Expanded public works will add still more and highway construction will probably not decline significantly. Agricultural-limestone demand will probably continue at the present high level under the Agricultural Adjustment Administration's soil-improvement program. All these factors are important but would be far overshadowed by a return to 90 per cent. of capacity in steel-ingot production and the recovery of private-construction expenditures to the 1928 total of $8,500,000,000."

The trend in output per man-hour in the next few years, the report said, will be determined by the demand for crushed stone, the increased utilization of equipment recently installed, and the adoption of improved techniques at operations now undermechanized or functioning inefficiently.

"The extent of impending installations" the report continued, "is difficult to estimate. No inventory of items of equipment and of the capacity of such equipment, in comparison with the best now available, is on hand for use in prognostication. Productivity figures compiled for the present report indicate, however, the possibility of a substantial increase in output per man-hour through the adoption of improved techniques at operations producing half the commercial tonnage of crushed stone. In view of the promptness with which many operations installed machinery and improved their production practices under the stimulus of increased volume in 1936, it appears that any considerable recovery of volume would foster modernization in this large segment of the crushed-stone industry.

"If commercial production reaches the 1929 total of 132 million tons in the next five years, it will probably be produced at an average of 2½ tons per man-hour. At 2½ tons per man-hour and 2,000 hours per man per year—the average in 1929 was 2,095—the labor of about 26,400 men will be required for the production of 132,000 000 tons. This is 19,000 fewer men than were employed in 1929 and 6,500 fewer than in 1933. If production five years from now is no higher than it was in 1936, the gain in productivity above 1936 will probably be much smaller and the output per man-hour will be well under 2½ tons.

"At 2,000 hours per man per year and at 1936 productivity the labor requirements for the 1936 commercial tonnage would be about 25,200 men compared with the 33,000 men actually employed

in 1936. Thus, unless there is a tremendous increase in production, the industry is likely to employ several thousand fewer workers in the next five years than it did in 1936."

The report estimated production, employment and output per man at commercial and all operations from 1929 through 1936 as follows:

Year	Number of Plants	Production (*short tons*)	Output per Man-hour (*short tons*)	Average Hours per Man per Year	Output per Man per Year (*short tons*)	Average Number of Men Employed
Commercial Operations						
1929	2,159	131,984,945	1,377	2,095	2,884	45,763
1930	2,165	116,523,149	1,379	1,980	2,730	42,675
1931	2,151	90,427,525	1,400	1,557	2,180	41,484
1932	2,089	60,173,358	1,266	1,375	1,741	34,571
1933	1,902	58,013,707	1,374	1,282	1,762	32,933
1934	1,958	67,390,436	1,536	1,303	2,000	33,700
1935	1,817	64,411,083	1,616	1,367	2,210	29,143
1936	1,968	93,175,614	1,849	1,547	2,861	32,573
All Operations						
1929	2,690	139,296,936	1,337	2,072	2,769	50,299
1930	2,643	123,862,811	1,337	1,968	2,632	47,065
1931	2,681	97,498,270	1,359	1,544	2,099	46,456
1932	2,719	67,177,535	1,211	1,361	1,648	40,764
1933	2,494	65,665,117	1,314	1 255	1,650	39,801
1934	3,270	84,699,176	1,432	1,230	1,760	48,112
1935	3,197	81,074,943	1,470	1,242	1,826	44,403
1936	3,639	122,599,090	1,688	1,478	2,495	49,135

The report is part of the series of studies of *Mineral Technology and Output-per-Man Studies* being carried on in coöperation with the Federal Bureau of Mines by the National Research Project on Reëmployment Opportunities and Recent Changes in Industrial Techniques, of which David Weintraub is director.

A considerable part of the study is devoted to a discussion of technological changes in the industry. The report notes that the major technological advances that have taken place in the quarries, mines and plants of the crushed-stone industry have been applications to crushed-stone production of technological improvements made in other mineral industries.

The production of crushed stone is a process similar to that of delivering stone to the kiln in cement operation; as a result improved crushing equipment and handling practices were in many instances introduced into crushed-stone operations following their application to cement production.

"Successful quarrying," the report said, "depends in general upon the selection of equipment and practices that promise maximum efficiency for the character of available rock and the anticipated scale of production. One of the changes in quarrying practices during the past 35 years resulting from technological advance has been the shift from working several low benches on a thick deposit to working the full height of the quarry face, with huge primary blasts replacing the frequent small blasts. This change was made during the transition of the quarrying operation of the crushed-stone industry from a manual to a mechanical process. At thin deposits the working face under hand-labor operation was the full height of the deposit and there was no choice with regard to benches.

"The installation of equipment in such instances has resulted in greater efficiency but has not, of course, changed the height of the face worked. In recent years some operators have elected to use benches on very high working faces, partly because of the greater efficiency of wagon-mounted drifter drills as compared with churn drills on blast holes up to 40 or 50 feet deep and partly because at some operations the smaller primary blasts produce a better-fragmented product. The advantages or disadvantages of this procedure depend largely upon the circumstances under which an individual quarry operates, such as the hardness and structure of the rock and the relative drilling speed of alternate types of drills."

The report observed that the successful introduction of power shovels into the stripping operation of a number of quarries between 1900 and 1910 marked a long step forward in quarrying efficiency and broadened the field of commercially practical operation. The first power shovels used in the industry were of comparatively small dipper capacity, traveled on rails and were able to swing through only a limited arc. The high capacity of the modern equipment is the result of several important changes since steam-shovel stripping was introduced. Efficient power shovels to-day are available in a wide range of sizes, the working radius has been increased greatly, both by lengthening the boom and the dipper stick and by the change to the full-revolving type. in which the shovel can swing in a full circle, thus making it possible to dig in any direction. And most shovels installed in recent years are mounted on crawler treads to give them greater mobility.

This marked improvement in the rate of overburden removal necessitated a comparable transformation of the waste-haulage system. The size of both locomotives and cars was increased and 25- to 50-ton locomotives powered by steam, and later by electric motors, gasoline or Diesel engines, became fairly common. Large, easily emptied steel cars replaced the carts and small wooden dump carts, while in 1920 there was introduced the track shifter, a machine that lifted the rail and swung it to a new position, effecting substantial savings in labor and time.

"In consequence of the great advance in stripping efficiency since 1900," the report said, "overburden as thick as 50 feet is now being cleared away from rock deposits. From the economic standpoint the outstanding characteristic of stripping is the enormous variation in the ratio of overburden to rock among enterprises which are in competition with each other. The pronounced decline in labor requirements for stripping resulting from mechanization has reduced the relative importance of stripping in the quarrying operation as a whole and has made possible successful production under overburden conditions prohibitive 40 years ago."

With regard to current drilling and blasting practice, the study showed that developments of the past few decades had made available to crushed-stone operations equipment of greatly increased efficiency for drilling holes of any depth and diameter used in quarry blasting. Power churn drills and derrick-mounted drifters can be used as alternative equipment or in combination for primary drilling, and efficient, lightweight drills of the jackhammer type are available for secondary drilling and as auxiliary equipment in primary blasting where the plan of the blast holes includes some shallow holes.

The power churn, it was found, did not attain its present success until improvements had been made in the capacity and mobility of power shovels, in the efficiency of secondary-drilling equipment and in primary-blasting practice. The drifter has gained steadily in efficiency through added strength of working parts, greater length of drill steel and size of bits, and increased power and cutting speed. The study showed that both the power churn drill and the drifter were supplemented by pluggers in most quarries; that the drifter had a much higher drilling speed than the churn drill and was highly efficient for working faces under 40 feet; and that the power churn had its special use on a very high working face.

The survey also established that while, in some cases, huge primary

blasts break down less rock per pound than smaller shots, the large shots in general show a net gain resulting from increased efficiency of the operation as a whole. Summing up the developments in drilling and blasting operations, the report found the principal recent changes had been the increased mobility, more efficient operation of power, and the use of detachable bits and mechanical sharpeners.

"There is widespread interest," the report added, "in experimenting with the arrangement, depth, and diameter of blast holes to determine combinations or variants best suited to the needs of the individual quarries, and a similar tendency is observable with respect to the explosives used. Further improvement may be expected during the next decade."

The report called attention, in discussing changes in loading equipment, to significant improvements made in the last 10 years in the power plant, design, weight, and operating speed of small-capacity shovels, which it held were highly important in making efficient mechanization technically possible for comparatively small operations. These improvements also were found to have brought about better loading performance at some large-scale operations where flexibility of the total loading equipment was improved by the addition of a small shovel to large units already in use.

The study showed that the rapid development of motor trucks for heavy work had resulted in the introduction of truck haulage at many crushed-stone operations, and that while for the most part truckage had replaced wagon haulage, some operations had replaced industrial-railway transport by trucks. The ease with which a truck can be driven to any loading point in the quarry without prior expense of laying roadbed or track, the report pointed out, makes it a highly effective complement to the tractor-mounted revolving shovel, although a relatively smooth roadbed to the quarry face must be maintained.

"Some quarries," the report commented, "are confronted with special topographical problems and have to employ unusual methods of transportation. If the stone must be carried over valleys or streams, aërial tramways are constructed. The buckets are generally of small capacity and can therefore be used only where the stone has been crushed at the quarry or where fine fragmentation has been obtained in blasting. Pit quarries generally use inclined-cableway hoists, although some pit quarries and bank quarries have installed belt-conveyors for quarry transportation and some shallow pits use motor-truck transport."

Although the great preponderance of the crushed stone produced in the United States is obtained by the quarrying of surface deposits, a number of large limestone operations work deposits underground, but this number has not increased during the last decade. Blasting in limestone mines differs from the quarrying practice in that explosives which release noxious fumes are unsuitable for underground work, and it is therefore generally impractical to use black powder. While black powder may have been used in the early days of some of the oldest mines, it has been displaced by types in which the amount of noxious gas given off on detonation has been greatly reduced. Ammonia dynamites are in fairly common use.

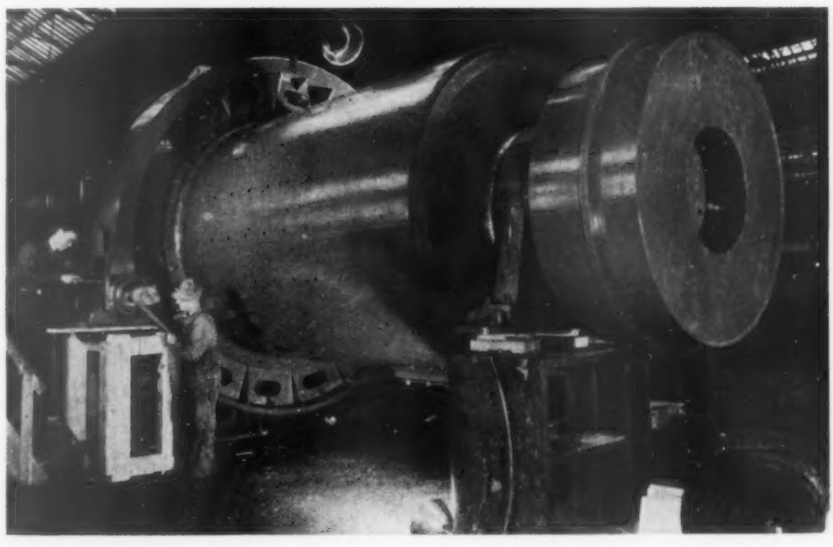
The study showed that, despite limitations on the use of power loaders underground, hand loading was so slow by comparison that underground power shovels had gained steadily in importance in limestone mining. Animal haulage, used almost entirely in 1900, also has been either partly displaced or entirely superseded by various forms of mechanical haulage in the mines, with electric locomotives the most popular type in current use because electric power does not burden the ventilation system.

Roughly one-fifth of all the men employed at a crushed-stone operation are required for crushing, screening, and other processes of preparation, to produce marketable products from the quarry or mine.

"Although the lay-out, equipment, and functioning of any given crushing plant can not be regarded as representative of the industry as a whole," the report said, "the fundamental characteristics of crushing-plant construction and operation are uniform enough to make possible a brief description in general terms.

"Nearly all crushed-stone plants are equipped with primary and secondary crushers, screens for sorting the crushed stone according to size, and some form of conveyance, such as belts or bucket-elevators, for transporting the stone through the various stages of preparation. Many plants have, in addition, mechanical feeders for regulating the flow of stone into the primary crusher, some form of washing equipment, and equipment for loading stone for shipments from the stock-pile.

"For example, a crushing plant described recently uses a chain feeder for feeding the stone to a gyratory crusher for primary breaking; a conveyor belt carries the discharged stone to a double-decked, vibratory scalping screen; the oversize stone moves on conveyor belts to either of two secondary crushers; the secondary crushers discharge to conveyor belts leading back to the belt which empties on the double-decked screen; stone passing the screen moves on to the screening house for further sorting and from the screens to 18 live-storage bins; stone from the several bins is fed to the loading-out belt-conveyor through accurately calibrated gate feeders, so that sizes may be combined according to specifications; a final vibrating screen removes dust from the stone before final unloading to the railroad loading tipple or truck-loading bins. Although this plant's lay-out is more elaborate than usual, it illustrates the extent to which precision in sorting and the maintenance of a smooth flow of product characterize the work of a modern crushing plant."



Shop assembly view of large Allis-Chalmers slug mill, just shipped to the Columbia Construction Company for use in connection with the new sand-and-gravel plant which will serve the Shasta Dam project in California. This revolving machine will be used to disintegrate clay and other undesirable material. It is 8 feet in diameter, 11 feet long and weighs approximately 88,000 pounds.

War Demand for Fluorspar May Test Capacity of New Plant in Colorado

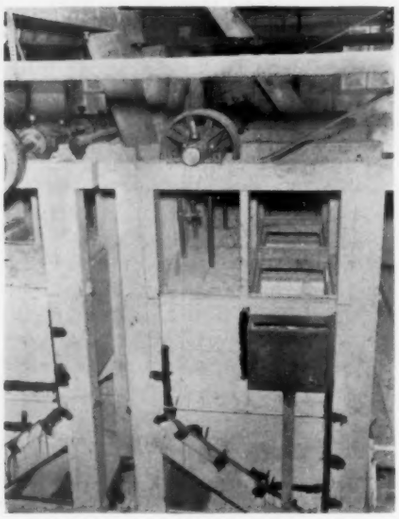
Plant of the Colorado Fluorspar Corporation near Salida.

ONE of the direct or indirect results of the chaotic conditions in Europe has been a renewed activity in the fluorspar industry. In recent months a number of new plants have been built to produce this material, some replacing older plants or supplementing them. One of the most noteworthy is the new plant of the Colorado Fluorspar Corporation, 9 miles north of Salida, Colorado, which marks the opening of a new deposit.

Rumors of the discovery of valuable deposits of fluorspar have been common in the Rocky Mountain states, especially in Colorado and New Mexico, but only a few of these have reached the pilot-plant stage. This particular deposit was discovered in 1931 but its numerous outcroppings were only picked at until 1934, when the actual vein was located and opened. After careful investigation the present owners in June, 1936, purchased the property, which includes 4,000 lineal feet of the vein. The deposit is a near-by vertical fissure vein with granite on one side and rhyolite on the other. It varies in width from 8 to 23 feet and is known to extend to a depth of over 200 feet without change.

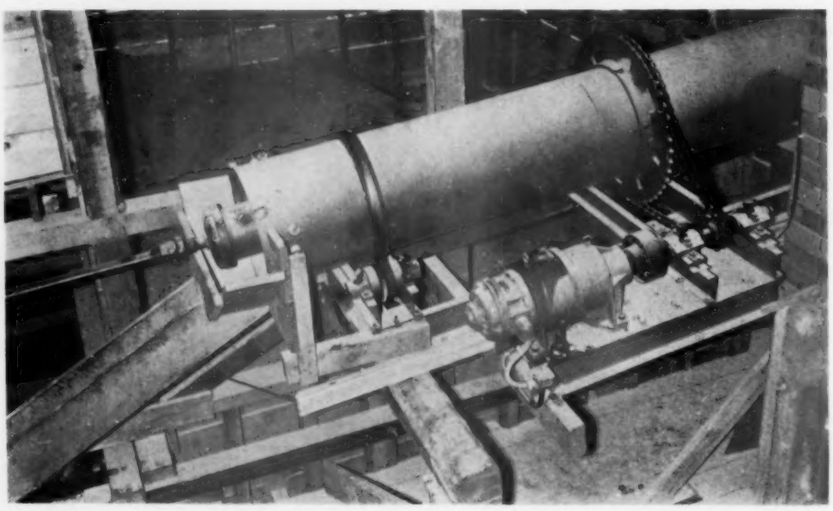
Nearly three years were spent in developing the deposit before the plant was built. During this period nearly 60,000 tons of ore was blocked out and three openings were made in the deposit. Tests showed a fluorspar content of from 60 to 70 per cent. and a possible recovery of 80 to 85 per cent. Impurities consist almost entirely of silica.

The new plant went into operation September 1, 1939. It has a rated capacity of 100 tons daily. This capacity can be doubled by installing additional equipment. The Denver Equipment Company supplied most of the equipment and made the tests on which the decision to build the plant was based. Two products are now being made, 85-5 gravel fluxing spar containing 85 per cent. fluorspar and less than 5 per cent. silica, and acid spar ground to 65-mesh fineness with a fluorspar content of 97.5 to 98.5 per cent. The gravel spar is sold to steel mills and the acid spar to ceramic industries and for the manufacture of hydrofluoric acid, glass, and other products.



One of the sets of 4-cell, fixed-screen jigs.

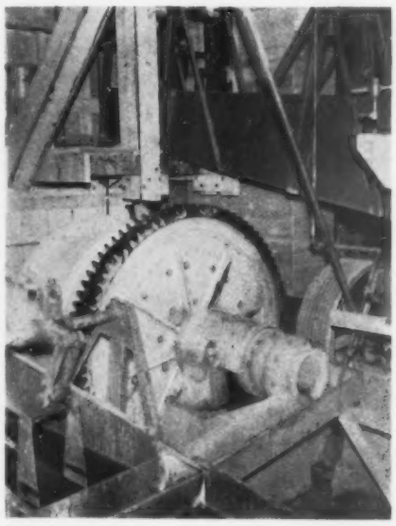
The plant is now being supplied by tramming from a tunnel with its portal on the same level as the mill. Another adit has been opened 35 feet higher up the hill and this will supply the mill while the lower tunnel is being ex-



The 14-foot rotary drier which reduces moisture to less than 1 per cent.

tended and a shaft sunk to a still lower level. Another opening has been made in a small branch vein.

The raw material is discharged on a sloping-bar grizzly with ¾-inch openings. The oversize material goes to a 14-inch by 20-inch Austin-Western jaw crusher set at ¾ inch. The crusher product and the material passing through the grizzly are carried by a bucket-elevator into the 150-ton raw-material storage bin. A Denver adjustable-stroke ore feeder (endless-belt type) feeds either the jig flow, which is now being used to make gravel fluxing spar only, or the flotation flow. If desired both flows can be supplied simultaneously in any desired proportions.



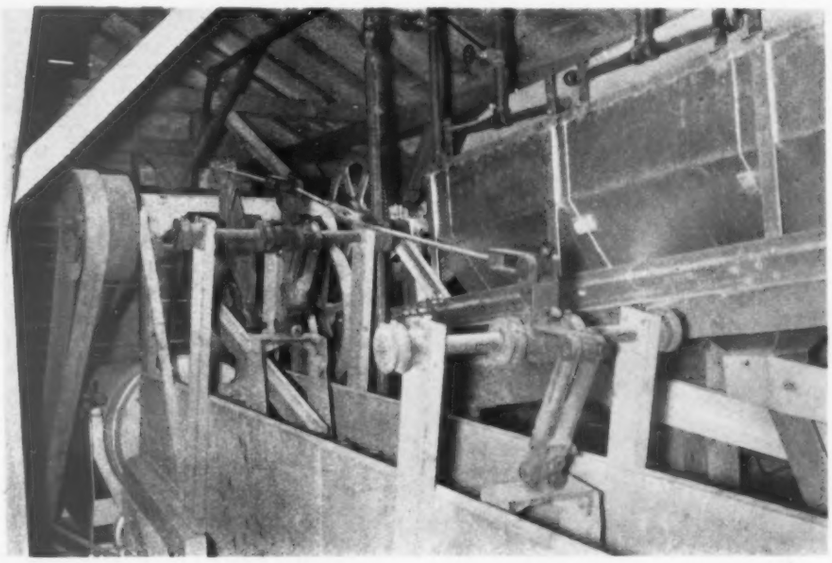
The rake classifier.

In the jig flow the raw material is carried by a bucket-elevator to a Hendrie & Bolthoff drum-washer section followed by a trommel. Four of the six sizes made by the trommel—$^{9}/_{16}$-, $^{7}/_{16}$-, $^{5}/_{16}$-, and $^{3}/_{16}$-inch—are chuted separately with four of six Ellis Harz fixed-screen type 4-cell jigs. The minus $^{3}/_{16}$-inch product goes to a small rake followed by a trommel in which all the mud and the extreme fines are removed before this material is split to the other two jigs. The hutch products of all the jigs are fed to a Morse Brothers drag-chain dewaterer. The dewatered material is elevated into two 100-ton storage bins from which trucks are loaded.

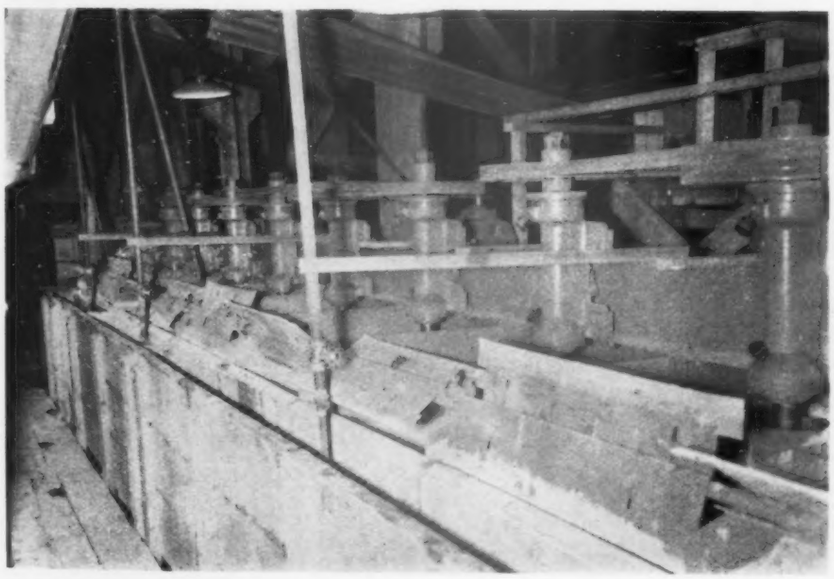
The tailings from the jigs go into another dewatering drag from which they are fed, with the plus $^{9}/_{16}$-inch material from the trommel, into the ball-mill in the flotation flow.

For flotation products the raw material is discharged from the elevator following the ore feeder into the 5-foot by 6-foot Ball Foundry Company open-end ball-mill. The feed to this mill consists of the minus ¾-inch raw material and the jig tailings and trommel oversize from the jig flow. A Denver feeder above this mill can feed dry reagents into the mill pick-up sump. The mill product is discharged into a Morse Brothers 30-inch by 14-foot rake classifier from which the oversize (plus 65-mesh) material is returned to the ball-mill.

Ore feeder which handles raw spar from bin to either of two flows.

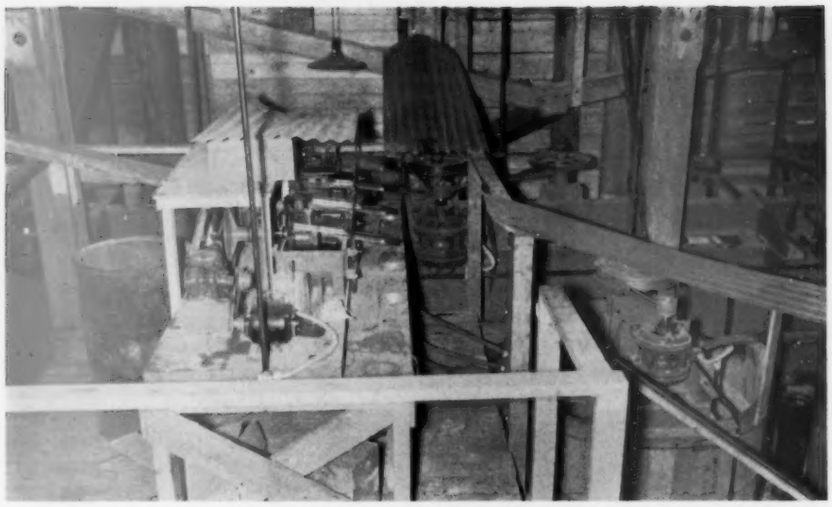


Trommel and drum-washer.



Part of the row of nine flotation cells preceding the filter.

The product of the rake classifier (minus 65-mesh) is fed by a 2-inch Wilfley pump into a Denver conditioner. Reagents are added from two Denver reagent feeders, one with two and the other with four compartments. The mixture is then discharged to a bank of nine Denver No. 18 Sub-A flotation cells. The concentrates, containing 40 per cent. water, are discharged to a bucket-elevator feeding a 6-foot diameter by 4-foot Denver revolving-drum filter, which reduces the moisture content to 8 per cent. The filter cake is discharged into a 14-foot Denver Tedrow type rotary steam drier. The drier product contains less than 1 per cent. moisture and is discharged into two 40-ton bins. The acid spar can



The conditioners with reagent feeders at left and flotation cells in background.

be sacked from these bins or loaded into trucks. Trucks haul all the products to a siding on the Denver & Rio Grande Western Railway about a mile from the plant.

A 125-horsepower Caterpillar Diesel engine drives a Sullivan 600-cubic foot compressor through Gates V-belts. This compressor supplies all the air for drilling in the mine. The jaw crusher is also driven from this engine through a jackshaft and flat belts. All the other equipment is driven through individual electric motors. Power for these motors is generated by a steam plant consisting of a 300-horsepower boiler and a Chuse Corliss-type steam engine driving a 150-Kilovolt-ampere, 440-volt, 60-cycle generator. The boiler is of historic interest because it came from the old State Capitol building. It is fired by a Combustioneer stoker.

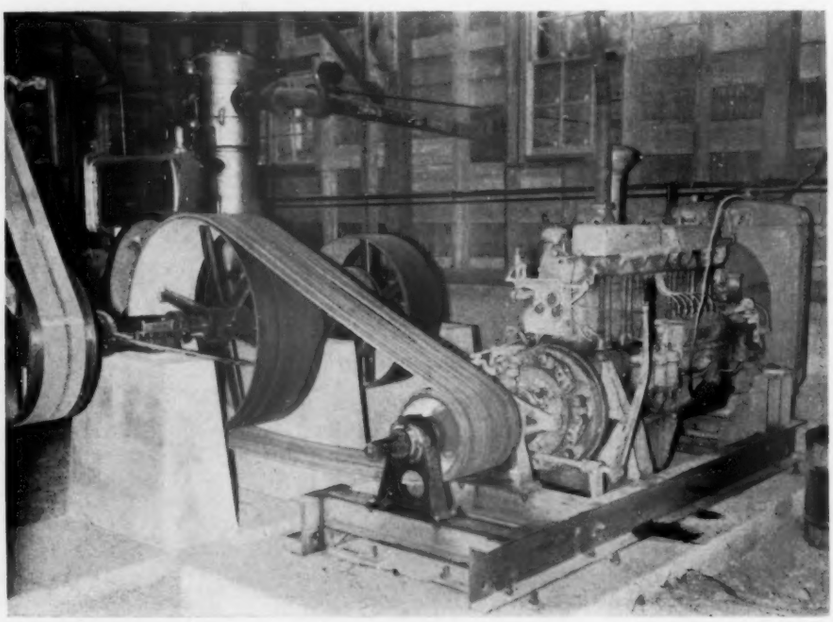
Water is pumped from a well in a near creek by a 4-inch pump driven by a 15-horsepower motor. A 50,000 gallon tank on a hill above the plant provides adequate pressure for all purposes. A Gardner-Denver vacuum pump and a Roots-Connersville blower supply vacuum and pressure, respectively, for the filter. Both are driven from the same 7½-horsepower motor through Gates V-belts. The tailings from the flotation cells and all other waste are piped to a pond to be clarified before the water goes back into the creek.

The company is in charge of experienced local men. S. B. Collins, president, is a mining engineer of wide experience. Everett Cole, vice-president, is also mayor of Alamosa, Colorado. R. B. Spruill, secretary, treasurer and general manager, is a former banker who has had a broad experience in mining in this and other sections of the country. Warren Donnelly, mill superintendent, learned the fluorspar business in the Rosiclare, Illinois, district.

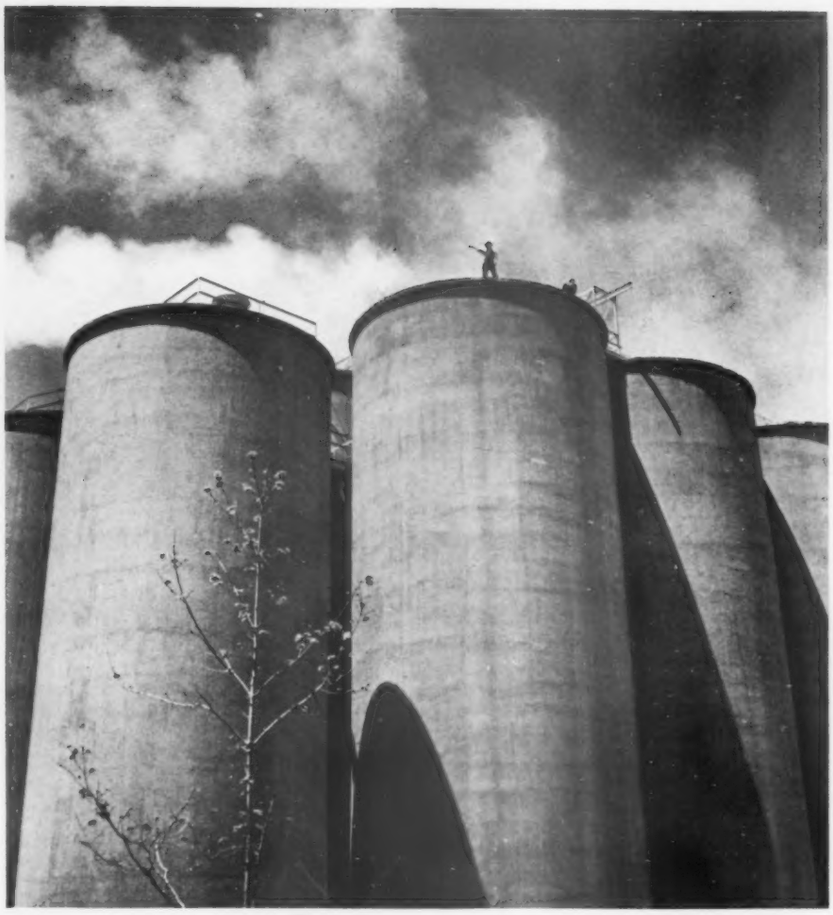
Stoker serving boiler which came from old capitol building in Denver.

The 2-inch pump which feeds rake-classifier fines to conditioners ahead of cells.

Moisture is reduced to 8 per cent. by this drum-type filter.



Diesel engine, compressor and drives.



LEFT—A view of the recently-completed storage silos at the Hudson, New York, plant of the Universal Atlas Cement Company.

Universal Atlas Completes Half Century as Maker of Cement

NOVEMBER, 1939, marked the fiftieth anniversary of the beginning of operations of what is now the Universal Atlas Cement Company, a United States Steel Corporation subsidiary. During these fifty years the company originated a number of fundamental improvements in the manufacture of cement and pioneered in important developments of its uses. The company's publicity department has reviewed these as follows:

"A predecessor unit of the Universal Atlas Cement Company was the first to use and develop the rotary kiln, the most important development in cement manufacture, a development that simultaneously increased the quality and uniformity of the product and reduced its cost.

"It was the first to make commercial use of powdered coal in the production of clinker. This likewise increased the efficiency of cement manufacture and now is so generally used that to-day the cement industry is the country's largest user of powdered coal.

"It was the first to use plaster of Paris to regulate the setting time of Portland cement. Another form of the same material, gypsum, is now used throughout the industry, and its use is designated in the standard specifications for Portland cement of the American Society for Testing Materials and the United States government.

"It was the first in this country to develop the use of granulated blast-furnace slag instead of clay or shale in the manufacture of Portland cement.

"It was the first in this country to make a high-early strength cement when it introduced 'Lumnite.' Its introduction has developed the use of refractory concrete, an entirely new feature in the refractory industry.

"It was one of the earliest producers of pure white Portland cement, and has been a leader in dissemination of information on the use of this product in specialized fields.

"Universal Atlas also has taken a leading part in developing the art of making concrete—the final product of value to society. Early in this century, it coöperated with Lewis Institute, Chicago, in setting up and maintaining a Structural Materials Research Laboratory which pioneered in the making and dissemination of fundamental studies of concrete and which set the pattern for successor organizations where cement and concrete research has continued.

"It was the first to promote concrete roads. During their early development, the company maintained a corps of trained field engineers, issued pamphlets and books, and provided the leadership for the National Conference on Concrete Road Construction which was attended annually by road officials and road builders from all parts of the country. Concrete pavements to-day provide the largest single outlet for the country's cement production. The company took a similar leadership in the development of concrete on the farm, disseminated literature for farmers, and conducted the first National Conference of Farmers' Institute Workers.

"It was the first cement company to develop organized safety education for plant workers. This has spread to the entire industry and each year now the Portland Cement Association awards a safety trophy to each plant that operates an entire calendar year without an accident. Each of the nine Universal Atlas plants has won this trophy at least once; several have won it two or more years, and one has won it seven times.

"The company, likewise, has been a leader in organizations of the industry. During the World War John R. Morron, former president of the Atlas company, was chairman of the cement committee working with the War Industries Board, while E. M. Hagar, former head of the Universal company, B. F. Affleck, former head of Universal Atlas, and Blaine S. Smith, its present head, each served several years as president of the Portland Cement Association.

"For many years the cement and concrete developments initiated by Universal Atlas have contributed, and for many more years will continue to contribute, to the making of better cement and better concrete at lower cost. Simultaneously, during this half century, the company has provided work for thousands of employees, has bought millions of dollars of supplies that provided work for thousands of others, and has helped support local, state, and federal governments by the payment of millions of tax dollars. Thus does industry serve itself, support government, and benefit society."

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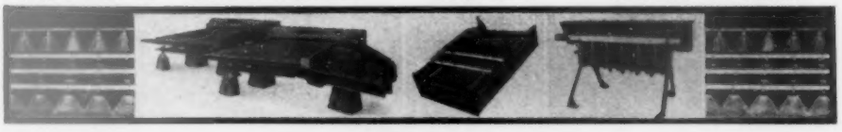

Personal Mention

Irvin L. Clymer.

IRVIN L. CLYMER has been elected president of the Michigan Limestone & Chemical Company. He succeeds John G. Munson, who was recently elected vice-president, raw materials, United States Steel Corporation of Delaware. The new president, a graduate of Purdue University, joined the Michigan Limestone & Chemical Company in 1926 as chief engineer. Prior to that time he had served with the Robins Conveying Belt Company as draftsman and engineer. He has been vice-president since 1938. JOSEPH PENGLASE, the new vice-president succeeding Mr. Clymer, has been connected with Michigan Limestone & Chemical Company since 1916 when he began as master mechanic. In 1928 he was made general superintendent, the position which he has held until the present time.

G. D. ANDREWS has been made sales-promotion manager of the Celotex Corporation, Chicago. Prior to this appointment, Mr. Andrews was a member of the merchandising staff engaged in organizing and directing national sales-promotion programs.

W. H. CLUM has started production of fluorspar from a deposit near Gila, New Mexico, and is operating under the firm name of the General Mines Company.

A. E. DOUGLASS has been elected president of both the Allentown Portland Cement Company and the Valley Forge Cement Company, succeeding the late R. S. Weaver, with C. H. BREERWOOD continuing as vice-president and general manager and F. A. WEIBEL, as secretary and treasurer. In assuming his new duties, Mr. Douglass resigns as president of the Fuller Company where he is being succeeded by J. W. FULLER, a son of the company's founder. Other new officers at the Fuller Company include: P. F. STAUFFER, vice-president in charge of sales; J. H. MORROW, vice-president in charge of engineering; and G. K. ENGLEHART, assistant to the president.

ROBERT P. LYONS, vice-president of the Ready Mixed Concrete Company of Kansas City suffered a broken collar bone and fractured a thumb when the horse he was riding fell at the Mission Valley Hunt Club recently.

RALPH S. MACPHERRAN, chief chemist of the Allis-Chalmers Manufacturing Company for many years and identified with the iron and steel industry for nearly 50 years, died November 13 while visiting at Duluth. HAROLD J. STEIN, research engineer of the manufacturing department, has been appointed director of research, chemistry and metallurgy bringing all these activities under one head. His assistant will be J. T. JARMAN.

M. D. CATTON of the development department, Portland Cement Association, Chicago, discussed soil-cement roads and construction procedure before the fourth annual Oklahoma highway and street conference held at Norman, Oklahoma on November 3.

O. N. LINDAHL, controller of the Universal Atlas Cement Company, has been elected to the presidency of the Controllers' Institute of America. He has been active in the organization for many years.

JEFF SHIELDS, superintendent of the Lawrence quarry of the Oklahoma Portland Cement Company, was injured recently when he was struck by a quarry car. He sustained a scalp wound and fractured his collarbone.

W. FRED CLARK, 53, former traffic manager of the Lehigh Portland Cement Company, died after a heart attack at the home of his brother in Chicago a few weeks ago.

CARL R. YANSON, 53, vice-president and a director of the Cleveland Quarries Company died suddenly in New York City while there on business recently. Burial was in Cleveland, Ohio. He was secretary of the National Sandstone Association.

RALPH S. WEAVER, 67, president of the Allentown and Valley Forge Portland Cement Companies, passed away recently at his home in Catasauqua, Pennsylvania. He was a native of New Jersey and a veteran of the Spanish-American War.

C. P. BEAVERS, 73, president and treasurer of the Peery Lime Company of North Tazewell, Virginia, passed away recently following a heart attack. He had been active in the lime industry for about 20 years.

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WRITE FOR CATALOG NO. 37

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NAYLOR LOCKSEAM SPIRALWELD PIPE

JOHN DIETERMAN, 68, general superintendent for fifteen years of the Quincy, Michigan plant of the Wolverine Portland Cement Company, died on November 9 at University Hospital in Ann Arbor. He was a native of the Netherlands and came to this country in 1899. He had been connected with the cement industry since 1904 in various capacities.

THADEUS MERRIMAN, prominent engineer who died September 26 after a two months illness is well remembered for his lively interest in Portland cement and his development of the "Merriman specification" for use in projects under his direction. Never a believer in the idea that "cement is cement," he was an extremely active protagonist for closer control of burning, grinding and clinker storage, over and beyond the requirements of standard specifications.

H. H. "JACK" CHAMBERS, 47, western sales manager of the Caterpillar Tractor Company, died at Oakland, California, on October 21 after a lingering illness.

WILLIAM F. KOENIG, concrete-products manufacturer at Cincinnati died recently after a two weeks' illness. He was 66 years old.

LAFAYETTE YEATES, 75, former superintendent of the old Kickapoo Sand & Gravel Company died at his home in Attica, Indiana, in October.

ROBERT G. ZADER, 61, general foreman at the Cementon plant of the Whitehall Cement Company died at his home in Laurys, Pennsylvania on November 1 after a brief illness. He was a native of Lehigh County, Pennsylvania.

• Holds Open House

Scores of interested townspeople, including a group of students at Lafayette College, attended the second "open house" conducted recently by the Easton Car & Construction Company at its plant in Easton, Pennsylvania.

Company engineers conducted the visitors in groups along the quarry-car assembly line and through the various departments of the plant.

The open-house idea was conceived by vice-president J. C. Farrell as a means of acquainting local residents, wives and families of employees and the students of the care and planning that go into the manufacture of Easton-Phoenix cars and other equipment made in the plant.

Occupational Diseases and the Law

Non-Occupational Disease

Russell v. Auburn Central Mfg. Co., decided by the Appellate Court of Indiana, *en banc,* October 16, 1939; reported at 22 N. E. (2d) 889. The employee concerned in this case was employed in a soldering department and was exposed to fumes from hydrochloric acid used in cleaning the soldering irons. He applied for compensation under the Indiana Occupational Disease Act, alleging that he had become disabled from an occupational disease; it was alleged that he had contracted a disease due to muriatic acid fumes, or that he had a latent, or inactive or dormant sinusitis and bronchitis which was made active and virulent by the fumes and emery and metal grinding dust. Compensation was denied by the Industrial Board of Indiana and the workman appealed.

The court finds the medical testimony in agreement that the workman was suffering from "disease common to a person in the ordinary walks of life

Easton-Phoenix trailers and tractors at the Rock Hill plant of the General Crushed Stone Co.

and that none of the diseases from which he was suffering was singular or peculiar to the employment." Since there was thus some evidence that the diseases from which the workman was suffering had no connection with his employment, the Court affirms the decision of the Board denying compensation.

Bronchiectasis

Koprda v. Cadillac Motor Car Division, decided by the New York Supreme Court, Appellate Division, Third Department, October 6, 1939; reported at 14 N. Y. S. (2d) 751. The State Industrial Board found that the claimant became disabled as the result of "bronchiectasis and bronchial asthma, an occupational disease which was contracted by him in and due to the nature of his employment." His employment was that of spraying automobiles, in which he inhaled fumes of Duco, a lacquer-nitroglycerine preparation, which caused irritation of the bronchi and made him suffer from asthmatic attacks, bronchiectasis and bronchial asthma. It was also found that the disease from which he was suffering arose from conditions characteristic of and due to the work which he was doing. Disability compensation was awarded under the Workmen's Compensation Law, and the award was unanimously affirmed in the appeal.

Silicosis

Rosacci v. United States Pipe & Foundry Co., decided by the New Jersey Court of Errors and Appeals, October 16, 1939; reported at 8 Atl. (2d) 707. This suit was brought by the administrator of a deceased employee. There was evidence for the jury to show that the workman, a young and vigorous man, died of silicosis poisoning. The building in which he worked was a wooden structure with a dirt floor. No provision whatever (according to the Court's summary) was made for ventilating the building, nor were there any exhaust fans. He had been in the defendant company's employ for some time and was employed in connection with the lining of pipes with a mixture of cement and sand. The mixing machine was in the building where he worked, and the proofs indicated that the place of work was excessively dusty. Both the cement and sand were there sieved before being placed in the mixer.

The basis of the action was the failure of the employer to use reasonable care to provide the employee with a reasonably safe place in which to perform his work, and in failure to give him warning of latent danger.

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Portable Conveyors—Revolving Screens

"Death from silicosis caused by dust laden air in the place of work is a well recognized fact," says the Court in its opinion. "Proofs of the failure to make any reasonable provisions for the protection of workmen in such dangerous places and the failure to exercise any care whatsoever to eliminate the danger so far as reasonably practical presented a question for the jury's determination." Under such circumstances, the granting of a nonsuit by the trial court is held to have been error (citing *Davis v. New Jersey Zinc Co.*, 116 N. J. L. 103, 182 Atl. 850).

Section 34:6-48, Revised Statutes of New Jersey, requiring an employer to "provide reasonably effective devices, means and methods to prevent the contraction by [his employees] of any illness or disease incident to the work or process in which they are engaged" is held to be no more than a restatement of the common law requirements.

Foreign Developments

Dehydration of Gypsum Depends on Conditions

The dehydration of raw gypsum begins, under the conditions customary in cement manufacture, at around 100 degrees C. The degree of dehydration is dependent not only on the temperature and the water vapor partial pressure, but to a considerable extent also on the size of the particles of the material. The liberation of water is not entirely uniform in the case of the individual varieties of raw gypsum for the critical temperature range in the cement industry, between 90-100 degrees C. The properties of individual types of cement are strongly influenced by the stages of hydration of the gypsum.—G. Mussgnug in *Zement* 28:339-344, 355-356, June 1 and 8, 1939.

Studies on Shrinkage of Mortar and Concrete

The variety of cement affects the shrinkage of mortar but has less effect on the shrinkage of concrete, so that concretes from quite different cements show the same shrinkage. The shrinkage of concrete is influenced much more by differences of temperature than by the nature of the cement. Increasing amounts of cement can indeed increase the shrinkage, but not to the extent originally assumed. Fine grinding also has less effect than was originally assumed. Increasing proportion of water increases shrinkage, but concrete mixed with a high water content may behave well. The aggregate, in its particle size and properties, affects shrinkage much more than the cement. Stone dusts increase shrinkage of mortar; whether they have the same effect on concrete has not yet been worked out.

The storage of mortar prisms is important in determining their behavior. They do not shrink in water or saturated moist air and the strengths are about the same in both cases. The shrinkage is not much different over potash than in a room of normally constant temperature. Combined storage leads to considerable variations. Many cements have a comparatively low tensile strength along with good compressive strength, a phenomenon apparently to be ascribed to tension. With increasing lapse of time, however, the shrinkage follows the same course between 56 and 90 days, so that storage of mortar specimens to 90 days seems superfluous.

There are no relations between the shrinkage of mortar and that of concrete. Cements that yield mortars with considerable shrinkage may produce concretes with very low shrinkage.

Cracking is a result of the relative effect of tensile strength and shrinkage; as soon as the shrinkage overcomes the tensile strength there is a crack. A combination of the two factors in Hedström's process was not satisfactory. Experiments were made with cement rings around iron cores, which had the disadvantage, however, of working with neat cement.—Dr. R. Grün and co-workers in *Zement* 28:345-350, 359-362, 374-379, June 1, 8 and 15, 1939.

Initial Hardening of Aluminous Cement

Unlike standard-cement concrete, aluminous-cement concrete cannot be mixed very long. This means among other things that not much heat can be removed during the mixing. However, the prolonging of the mixing process from 2½ minutes to 15 minutes or more effect considerable increases in strength, even at low and high temperatures; concrete so mixed has an increase in strength over normally mixed concrete up to 12-16 hours.

The admixture of lithium chloride also raises the strengths of aluminous-cement concrete and mortar at low, average, and high temperatures; but the individual cements vary in this respect. The use of lithium chloride always requires exact preliminary tests, because the amount of admixture can only be

very small and may only vary within narrow limits; if it is a little less than the correct amount it has no effect, and if it is a little more the concrete sets too quickly.

Given the problem of reaching within a few hours the strengths of aluminous-cement mortar or concrete necessary for practical operations, the prolonging of the time of mixing is to be preferred, because the stiffening of the concrete takes place gradually and can be interrupted at any time by stopping the mixer.—F. Keil and F. Gille in *Zement* 28:195-199, March 30, 1939.

Hardening Concrete with Silica Treatment

The silicate best adapted for hardening the surface of concrete is liquid neutral sodium silicate, 38/40° Baume, with a molecular ratio above 3 $\left(\frac{SiO_2}{Na_2O}\right)$ and free alkalinity expressed as NaOH less than 0.57 per cent. Surfaced appropriately treated with such silicate offer a very great resistance to wear.

Recent studies on this matter were carried on in the Materials Testing Laboratory of the Royal Military School, erected by Professor Verly. One set of specimens was made and tested in the standard manner. The others were specially treated by brushing the surface, applying a first coat of two parts of water to one part of liquid sodium silicate, then (after penetration of the first coat) a coat of water and silicate in equal parts and finally a coat of silicate alone. The wear tests (results are tabulated and graphed in the original) show a considerable improvement in resistance to surface wear resulting from the treatment.

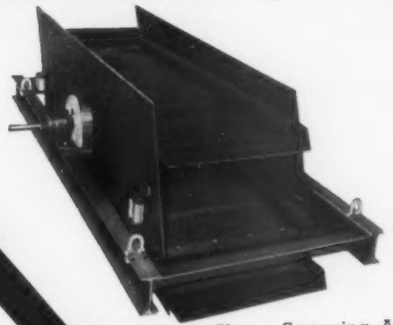
It is best not to use waters of acid reaction or charged with argillaceous substances. The atmospheric temperature plays a considerable part, and exterior work in times of rain or freezing must be avoided.—A. Debecq in *Verre et Silicates Industriels* 10:312-313, October 5, 1939.

Four Cement Companies Settle for $400,000

Four Texas Cement Companies have agreed to pay $400,000 in penalties and court costs and "be enjoined from creating or becoming a part of any combination for the purpose of restricting competition in the sale or manufacture of their product." The companies named in the suit are Lone Star, Southwestern, Trinity, and Universal Atlas.

The state alleged the companies had violated Texas anti-trust laws by forming a combination to fix prices.

NEW HOLLAND Vibrating Screens



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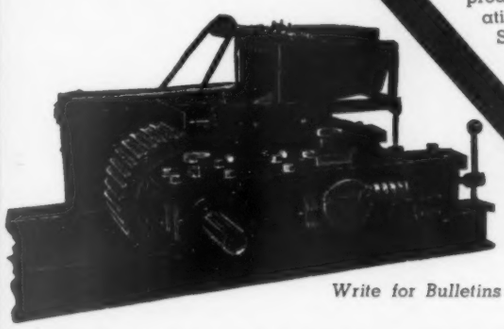

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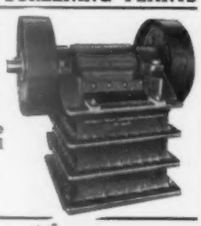

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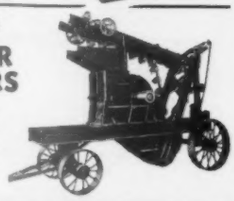

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Labor Decisions

Enforcement

In re Almroth et al., decided by the New York Supreme Court, Ulster Special Term, Albany County, June 2, 1939; reported at 14 Y. Y. S. (2d) 63. This decision confirmed the power of the New York State Labor Relations Board to reopen a case and hold new hearings concerning alleged unfair labor practices of an employer, and the validity of a complaint alleging an unfair labor practice not specifically set forth in the statute.

Section 704 of the New York Labor Law specifies nine unfair labor practices and further prohibits "any acts, other than those already enumerated in this section, which interfere with, restrain, or coerce employees" in the exercise of the rights guaranteed by Section 703, i.e., self-organization and collective bargaining. It was contended that the last subdivision of Section 704 added nothing to the preceding nine subdivisions; for, if it did, it would permit the Board to exercise legislative powers, and would be unconstitutional.

The Court rejects that contention, holding that "it is not at all times possible for the legislature to foresee in advance all the devious and novel methods by which its declared policy may be thwarted. Power may lawfully be conferred upon the body designated to administer the law to forbid, in individual cases, acts and practices which clearly interfere with the execution of such policy." If the administrative body acts in excess of the powers conferred upon it, its decision may be attached after, but not before, it is rendered. Section 707 of the Labor Law provides for appeal from a final order of the Board.

Seasonal Work

National Labor Relations Board v. Planters Mfg. Co., Inc., decided by the U. S. Circuit Court of Appeals, Fourth Circuit, August 29, 1939; reported at 106 Fed. (2d) 524. This matter arose on petition for rehearing on a former decision decreeing enforcement of an order of the National Labor Relations Board (opinion at 105 Fed. (2d) 750). The Court makes clear that the ordered reinstatement of thirteen employees does not mean that they must be furnished employment at a period when due to the seasonal nature of the business no employment is available, but merely that they be restored to their former position and given work when other like employees. Likewise, the order does not mean that the employees are to be paid back wages for the entire period that has elapsed since their discharge, but merely that they shall be paid what they would have earned during that period if they had not been discharged, taking into account the seasonal character of the employer's business.

Traffic News Digest

LEGISLATION

Transportation Act—The conference committee of the Senate and House are scheduled to meet in December in an attempt to iron out the differences between the two bodies in the transportation acts passed by each during the last session of Congress. The principal difference is the codification of the interstate commerce act as passed in Senate Bill 2,009. The sentiment in the House has been against codification. If the committee can agree on this subject, Chairman Lee of the House committee on interstate and foreign commerce, said it would not be difficult to reach an agreement on the proposed legislation itself. He said he hoped that it would be possible to have the conference report ready for consideration in the early part of the next session which will begin January 3. Since he made this announcement so many other things are coming to the attention of congressmen that it is doubtful if legislation on transportation will be completed before March 1.

RECENT I.C.C. DECISIONS

Cement—Rates charged on cement in container cars from Chapman, Sandt's Eddy and Hercules, Pennsylvania, to East Buffalo, N. Y., on shipments made between August 3 and September 6, 1936, were combination rates ranging from 21 to 23½ cents. The Commission has found these rates not unreasonable and has dismissed the complaint. In a dissenting opinion, Commissioner Porter said that these rates were higher than the rates on cement contemporaneously applicable from other Pennsylvania producing points and higher than the rates which had been found unreasonable on cement in other proceedings, for comparable distances, and that in his opinion the rates charged were clearly unreasonable. I.C.C. Docket No. 27,855, Lehigh Portland Cement Co. *et al. v.* Lehigh Valley *et al.*

In response to fourth section application No. 17,487, the Commission has authorized the Central of Georgia, the Green County Railroad Company, and the Gainesville Midland, to establish and maintain rates on cement from Birmingham, North Birmingham and Leeds, Alabama, to stations on the Greene County Railroad, Anderson's Crossing to Monroe, Georgia, inclusive, *via* the Central of Georgia, to Alapachee, Georgia, the same as those con-

temporaneously in effect on like traffic over the direct route from and to the same points, without observing the long-and-short-haul clause of section 4. I.C.C. F.S.O. No. 13,581.

Crushed Stone—The Commission has awarded reparation on finding that the rates charged on crushed stone from Security, Maryland, to Gettysburg, Pennsylvania, of 85 cents, and to Guldens, Pennsylvania, of 95 cents applicable between April 1 and April 14, 1938, and of 88 cents to Gettysburg and 99 cents to Guldens, applicable from April 15 to April 19, 1938, unreasonable to the extent they exceeded 70 cents to both points prior to April 15, 1938 and 77 cents on and after that date. I.C.C. Docket No. 28,197, North American Cement Corp. *v.* Western Maryland.

Sand and Gravel—On application of the Illinois Central, the Commission has modified its order of November 8, 1938, to permit the establishment of a rate of 60 cents a net ton for intrastate shipment of sand and gravel from Myles and Vicksburg, Mississippi, to Hattiesburg and Gulfport, Mississippi. This rate is to expire June 30, 1939. I.C.C. Docket No. 28,051, Increases in Mississippi Freight Rates and Charges.

Sit-Down-Strike Demurrage—With three commissioners dissenting, the Commission has found applicable demurrage charges collected on various empty, loaded, partially loaded and partially unloaded cars held in Detroit during the sit-down strike at the plants of the Chrysler Corporation. Such charges were, however, found unreasonable on cars forcibly held within the plants, in the period in which the complainant was dispossessed of its plants, and thus without the power to release the cars; the unreasonableness being to the extent that charges exceeded $1.20 per car per day including Sundays and legal holidays, the charges to be computed independently of demurrage charges accruing before and after such period. Since charges were collected, reparation with interest has been awarded. Complaint was brought under sections 1, 3 and 6 of the interstate commerce act. There were 687 cars held outside the plants on which $37,800 demurrage charges were collected, and 426 cars inside the plants on which the demurrage amounted to $58,052. The charges were based on the tariff rate allowing two days free time after which charges accrued at the rate of $2.00 per day for the first four days, excluding Sundays and legal holidays, and $5.00 for every day thereafter. The National Industrial Traffic League intervened in the case, and is trying to work out a rule with the railroads for the settlement of similar cases in the future. On the subject of a rule for the future the Commission said, "We will not attempt to formulate any precise rule for the future at this time. It is our understanding from the course of the oral argument that the whole matter is under discussion between the railways and the National Industrial Traffic League, of which the complainant is a member. The parties and the intervener, National Industrial Traffic League, will be permitted to submit any conclusions they may reach, and further consideration can be given to the entry of an order prescribing a rule for the future, if they are unable to agree, which hardly seems likely. If the carriers voluntarily put in a rule satisfactory to the shippers and to the Commission, there will be no necessity for an order for the future." I.C.C. Docket No. 27,950 Chrysler Corp., *v.* N.Y.C., No. 27,951, Same *v.* Detroit Terminal and No. 28,225, Same *v.* Grand Trunk Western.

Split Pick-Up and Delivery Service—The Commission suspended a proposed pick-up and delivery rule published by Agent Fowler as Rule 4. This rule provided that a shipment may be picked up at two or more places at the point of origin when it is consigned to one consignee at one destination and when such pick-up service is requested by the consignee, and that a shipment may be delivered at two or more places at the same destination when it is from one shipper only at one point of origin on the bill of lading and on one day. At the hearing Agent Fowler stated that the rule failed, in error, to provide a charge for the service, and he proposed to publish in lieu of the suspended rule, Rule 4(a) which was practically the same as Rule 4, except that it provided a charge of $2.20 for each pick-up and delivery in excess of one. The report said the allowance of an unlimited number of pick-ups and deliveries in excess of one without charge for the additional service would be in violation of section 217(a) of the motor carrier act, unless such service was stated as included in line-haul rates. While proposed Rule 4(a) would correct the omission, it was plainly open to criticism in many other respects. That part of the rule relating to split pick-up and delivery service was vague and indefinite, in that it did not indicate clearly that the shipment was to be filled from one consignor and to be tendered on one bill of lading. The rule purports to restrict additional pick-ups at origin to instances where such service has been requested by the consignee of the shipment. In effect it denies similar service to the consignor. In this respect the rule would be discriminatory since there would be no difference in the service, whether performed for the consignor or the consignee. The proposed rule was found unlawful. I.C.C. Docket No. I. & S. M-690 Western Coöperative Trucking Association Rates in Minnesota and North Dakota.

NEW COMPLAINTS FILED

Lime and Limestone—Reparation is sought on an allegation of unreasonable rates and charges on lime and/or limestone from Pleasant Gap, Pennsylvania, to destinations in Delaware, Maryland, Virginia, New York, Ohio and Pennsylvania, in a complaint filed by Leo Tessler, 1148 Manor Ave., New York City, in I.C.C. Docket No. 28,364, Whiterock Quarries, Bellefonte, Pa., *v.* Pennsylvania *et al.*

Sand—Reasonable rates and reparation are sought in a section 1 complaint involving the rates and charges on silica moulding sand (other than naturally bonded and ground or pulverized) from Geauga Lake and Phalanx, Ohio, and Utica, Pennsylvania, to Wheeling, West Virginia, in a complaint filed by W. W. Larkin, 8 Raymond Street, Wheeling, in I.C.C. Docket No. 28,343, Continental Roll and Steel Foundry Co., East Chicago, Ind., *v.* B. & O. *et al.*

TRAFFIC NEWS

Anti-Trust Law—On June 25, 1937, the Association of American Railroads adopted the following resolution: "It is hereby declared to be the policy of the Association that the public interest will be promoted and the integrity and credit of the railroad industry improved and maintained if the railroads refrain from establishing with motor carriers through routes or joint rates or fares which invade territory not served by such railroad and which is already served by one or more other railroads. It is further the policy of this association that it is not desirable for the rail carriers to enter into joint billing arrangements with, or to advance charges to motor carriers, except where the services of such motor carriers are within a terminal district." As a result of this resolution the B. & O. refused to go through with an arrangement for the establishment of joint rates with the Keeshin Motor interests. The trustees of the Chicago Great Western, however, disregarded the resolution and were cited to appear before the A.A.R. board for

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acting contrary to the provisions of the resolution. The matter was brought to the attention of Thurman Arnold, Assistant Attorney General who, through the Department of Justice filed a civil suit in the District Court for the District of Columbia against the Association of American Railroads, its officers and directors, and 236 member railroad companies, charging the defendants with violation of the Sherman anti-trust act. In his statement issued Oct. 25, the day the suit was filed, Mr. Arnold said, "If the restraint upon trade charged in the complaint is found to exist, this suit should restore to the individual railroads freedom of action to enter into through-transportation arrangements with motor carriers. Beyond this the purpose of the department does not extend. It is not its function to promulgate a transportation policy for the nation. Its sole duty in this case is to seek an emancipation of the railroads from the restraints of these agreements if they are found to contravene the Sherman anti-trust act. While it is impossible, of course, to determine now just what economic results would follow the restoration of freedom to individual railroads to deal with motor carriers, it is not unreasonable to expect that great impetus will be given to the establishment of coordinated rail-truck service, and that the practical experimentation in this field will develop more efficient and economical transportation channels, thus facilitating the movement of interstate commerce." President J. J. Pelly of the A.A.R. in a statement says in part, "Attention is called to the fact that there is no declaration of policy on the subject of railroads and motor carriers establishing through routes or joint rates unless the effect of such action is to cause one railroad to invade the territory of another. Under the law as it stands now, a railroad may not be constructed nor may it operate into the territory of another railroad without securing permission from the Interstate Commerce Commission. It is obvious that if railroads and motor carriers are to establish joint through routes and joint rates under which the territory of one railroad is invaded by another, the intent of the law will be defeated. There is no authority in the law compelling railroads and motor carriers to establish these through routes and joint rates. The only purpose of the resolution was to conform the practices of the railroads to the spirit of the law, and avoid wasteful duplication of transportation facilities and services."

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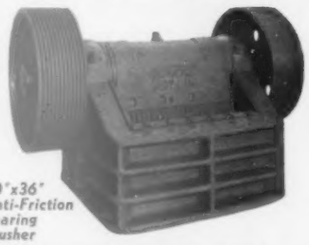
Are Good Crushers



10"x36" Anti-Friction Bearing Crusher

DEPENDABILITY+
RECORD PRODUCTION
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Jaw Crushers • Crushing Rolls
Elevators • Conveyors • Screens
Complete Portable or Stationary
Gravel or Quarry Plants

ROGERS IRON WORKS CO.

Write for Bulletins Nos. 303 and 304

CRUSHER BUILDERS FOR 40 YEARS

Give Us Details of Your Crushing Problems

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New Machinery and Supplies

• Truck-Mixer

The T. L. Smith Company of Milwaukee announces the addition of 3-, 4- and 5-cubic yard sizes to its line of Smith-Mobile truck mixers and agitators. Like the smaller sizes introduced two years ago, these new models are said to include refinements never before available on any truck mixer.

Instead of the conventional loading hatch, the Smith-Mobile is equipped with a large feed chute located at the high end of the drum. Since the drum revolves during the charging operation, shrinking and mixing begin as soon as the materials enter the drum. Water is introduced through the drum charging opening. A high-pressure, turbine-type water pump is regularly supplied as standard equipment.

The Smith-Mobile has an unusually high discharge which permits a larger radius of spout distribution. This feature is said to eliminate the need for ramps when the concrete is discharged into hoppers or high forms. The discharge door can be opened wide to permit inspection of the batch while the drum is revolving.

For discharging the batch, the operator merely reverses the direction of the drum. It is claimed that the speed of discharge is not controlled by opening and closing the discharge door. Even when the door is wide open, the operator can obtain either slow or fast discharge, as desired, by operating the clutch lever. Dual control levers are banked for operation from either platform or ground.

Other Smith-Mobile features include: Welded Man-ten steel mixer drum and frame . . . machine cut, heat-treated alloy steel gears . . . heat-treated, ground steel shafts on roller bearings . . . welded, annealed-steel transmission case and drum-support pedestal . . . oil-type disk clutches . . . two-compartment, over-flow-type water tank with calibrated gages and lubricated, plug-type valves . . . two-piece, swivel distributing chute . . . choice of separate gasoline-engine drive or power take-off for truck-engine drive.

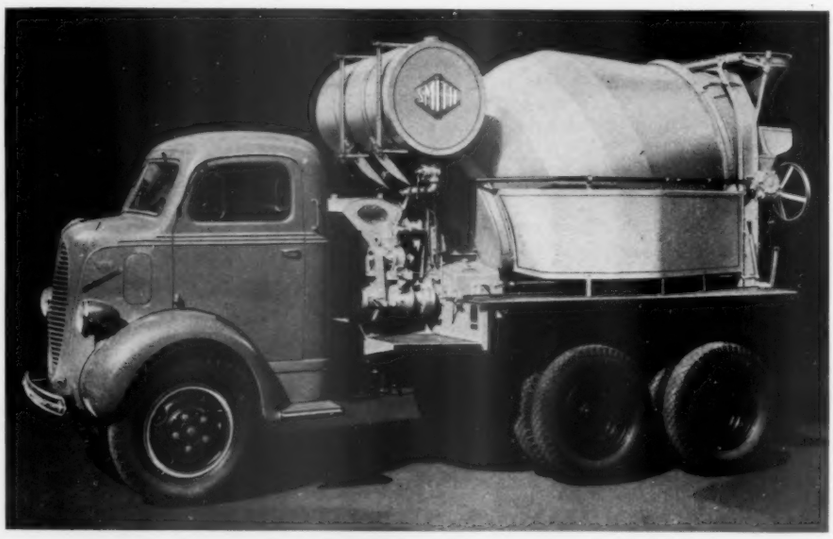
Catalog No. 198 is just off the press. Copies are obtainable from the manufacturer.

• Shovel

A new excavator that offers the rugged strength of the larger heavy-duty quarry and mining machines combined with the speed-lined design and mobility found as a rule only in machines of smaller capacities is now being offered by Bucyrus-Erie Company, South Milwaukee, Wisconsin. It is the 2½-cubic yard 54-B, a Diesel-powered convertible shovel, dragline, clamshell, lifting crane.

With husky quarry-type boom, wide outside dipper sticks, modern welded heavy-duty dipper, and positive independent crowd, the 54-B shovel front-end is the same type used so successfully on the 4, 5, and 6 yard Bucyrus-Erie quarry and mining shovels. Yet the machine is so compact that it comes within clearances of most U. S. Standard gage railroads and can be shipped without major dismantling. Clearances are reduced, and the center of gravity lowered, by combining roller path and swing rack in the truck frame casting; center pintle and the heavy reinforcements necessary to support it are eliminated by the use of single plane conical hook rollers; A-frame is arranged so that it can be easily lowered without dismantling the cab; and all excess weight is eliminated by the use of special modern, high-strength, light-weight alloy steels. Consequently, the 54-B offers a compactness and mobility which, the manufacturer claims, has never before been found in a machine of such large capacity.

Revolutionary in their simplicity, the new 54-B clutches set new standards in smooth, cool operation. Few parts, interchangeability of bands, and easy accessibility mean few adjustments, easy maintenance. Easy to operate,



The new 1940 model truck-mixer.

Diesel-powered convertible excavator.

these clutches give the operator the "feel" so necessary to fast operation.

Accessibility for maintenance and adjustment has been a major concern of the 54-B's designers. The entire right side of the cab is free of machinery, and a roomy cross-aisle between engine and main machinery provides ample space for making adjustments easily and quickly. In addition, the 54-B boasts many features contributing to ease of on-the-job maintenance. For example, the drive shaft is in two sections; hence either section of the shaft can be removed without disturbing the other. This convenient accessibility plus the machine's rugged strength keeps "time-out" at a minimum, so that more time can be spent in actual digging.

• *Excavator*

The new Lima Type 1201 is a combination shovel and drag-line and has all the power and ruggedness required of a big machine, plus the speed and economy of the smaller type. It is especially adapted to quarries, strip mines, drainage and levee work and heavy construction, where capacity and wide working ranges are necessary. When equipped as a standard shovel, it carries a 30-foot boom, 20-foot dipper handle and a 3-cubic yard bucket. For special work such as open-pit mines, the machine can be equipped with a 42-foot boom, 32-foot dipper handle and a 2½-cubic yard dipper.

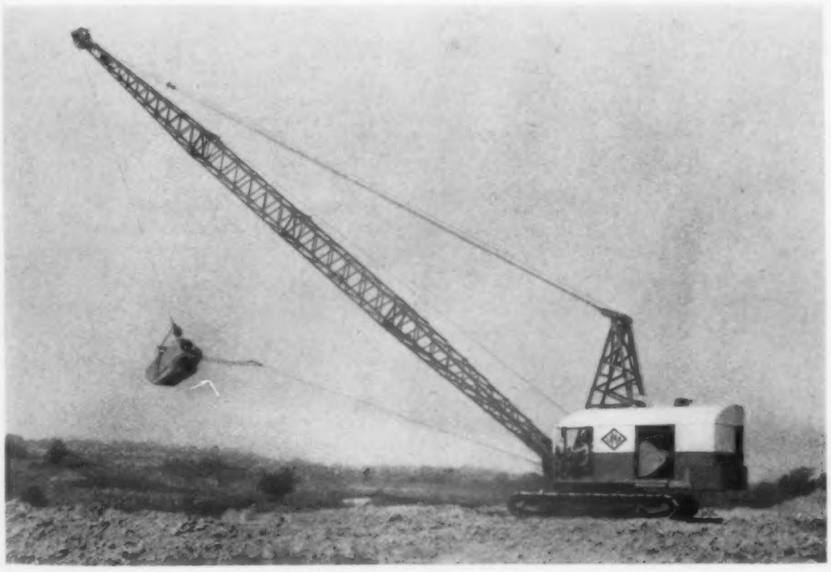
The new excavator incorporates many modern features. The shovel boom and dipper handle are of box-type design, electrically-welded throughout. Only three levers and two foot pedals are necessary to control the three major operations, hoist, swing and crowd. It is equipped with inside expanding clutches with housings cooled through radiation fins. The clutches and brakes have extra large diameter. Roller bearings are applied to the hoist brake and clutch housings to effect smooth clutch action. The hoist clutches are equipped with vacuum power assistors operating through toggles, which makes possible the lowering of load with the clutch engaged. This feature is especially adapted to crane work. Each major operation is independent of the other which makes it possible to hoist, travel, swing and raise or lower the boom simultaneously. The drums have extra large diameters. Instead of the diameters being fifteen or twenty times the size of the cable as is the case in many other machines, Lima drums are 30 or more times the diameter of the cable used, based on clam-shell and drag-line service, thus ideal conditions are afforded for assuring longest possible cable life. The crawler truck is composed of a one-piece base casting with seven axles on the ends of which revolve 14 open type self-cleaning rollers. Steering is accomplished with the upper frame at any position. More than one-half of the cab can be opened to give ample ventilation in hot weather. It can easily and quickly be converted in the field for dragline or crane service and can be furnished with either Diesel or electric power.

• *Portable Plant*

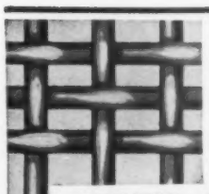
To answer the demand for a small plant to produce small, crushed gravel, the Pioneer Engineering Works of Minneapolis, has added another Duplex crushing plant to its line.

Heretofore, duplex crushing plants have only been used by the producer requiring large capacity. On the smaller jobs, plants with a single-jaw crusher have been used. But with the changing specifications requiring smaller crushed material, the single-jaw crusher is not sufficient. It has been found that the combination of a small jaw-crusher and a roll-crusher will produce more capacity, and smaller crushed material than a large jaw-crusher.

The new Pioneer 16-V crushing, screening and loading plant uses a 916 jaw crusher and a 16 by 16-inch roll crusher. The jaw crusher



The Type 100 drag-line with 100-foot boom and 2½-cubic yard bucket.



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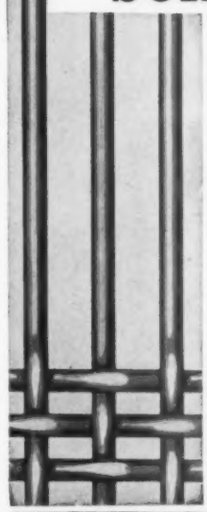

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On-the-job view of the new crushing-and-screening plant.

takes the large rocks and the roll crusher does the secondary and fine crushing.

One of the outstanding features is the "bottom deck feed," which has proved so successful on the larger sizes of Pioneer duplex plants. The bottom deck feed doubles the effective screen area and balances the work of the two crushers. It screens the pit material on the bottom deck and the crushed material on the top deck.

With this screening and crushing arrangement, the Pioneer owner has a flexible plant that will meet varied conditions. He can make road gravel, reject any percentage of sand, and produce "stone chips" for seal coat or cover aggregate.

The John A. Roebling's Sons Company of Trenton, New Jersey, announces the removal of its New York City offices from 107 Liberty Street to the twentieth floor of 19 Rector Street.

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CRUSHERS

Complete plants designed and equipped, including Screens, Elevators and Conveyors. Machinery for Mines and Rock Quarries, Sand and Gravel Plants. Engineering Service

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• Clam-Shell Bucket

A new feature in clam-shell bucket design, announced by the Blaw-Knox Company, Pittsburgh, aims to reduce maintenance problems resulting from the practice of "dropping the bucket."

When digging materials that offer considerable resistance to penetration, or in excavating work, it is customary practice for the crane operator to drop the bucket with considerable force in order to insure the advantage of good initial penetration. Similar shock and impact blows also result when handling materials out of railroad cars or barges, and in fact, the large majority of operating conditions impose impact and shock blows which may be classified as indeterminate stresses.

As a result of these impact and shock stresses, the bucket's head construction frequently becomes loose and wobbly, especially when these indeterminate stresses have to be transmitted from the head pin to the corner pins through a bolted or riveted construction.

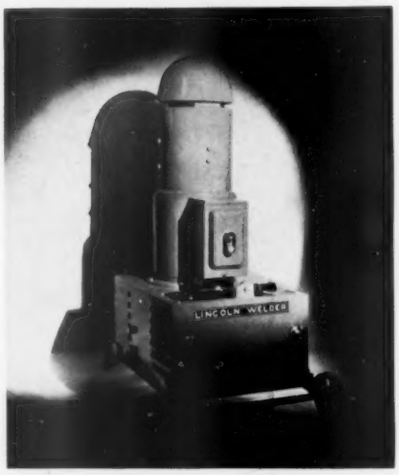
A practical solution to this problem has been the objective of a new type of lever-arm bucket recently developed by the Blaw-Knox Company. All four corner bars are mounted directly on the head pin. The cast-steel head block, when secured in position between the two plates, joins one pair of corner bars together in such a manner that a rigid A-frame assembly is obtained. As a consequence, this improved form of construction not only provides for a direct transmittal of stress and shock between head pin and corner pins, but also insures a rigidity which maintains permanently true alignment between the upper sheaves and lower sheaves—thus obtaining a condition conducive to long cable life.

Newly-designed clam-shell bucket.

The illustration shows one of the new buckets in operation. Of 1¾ cubic yard rated capacity, and weighing 4,550 pounds, it is handling loads of river sand averaging over 6,300 pounds.

• Arc-Welder

A new 200-ampere arc welder with a range for many welding applications ordinarily associated with considerably larger welding equipment, is announced by the Lincoln Electric Company of Cleveland. This new machine, because it is of motor-generator direct-current arc type, will weld virtually all metals and alloys and do hard facing work, according to the manufacturer. Its speed of operation and quality of results are reported to be exceptionally high for work of all sizes, under all operating conditions.



New 200-ampere arc welder.

The new welder can be used with either bare or shielded-arc-type electrodes. It has a current range of 60 to 250 amperes for welding duty.

A special feature, now available for the first time on small arc-welding machines, is the patented dual, continuous control. This advance allows independent adjustment of voltage and current, giving complete and separate control of arc heat and arc penetration, so essential for best and most economical production of sound welds in the many varied present-day arc welding applications. The many advantages of this feature will be readily apparent in plants using small portable welding equipment. Setting the welder is simplified by the fact that both voltage control and current control are self-indicating.

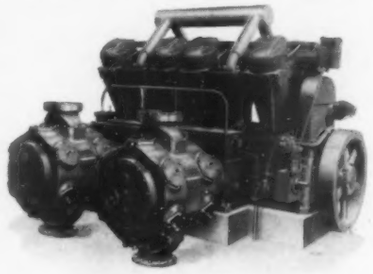
• Compressor

The Ingersoll-Rand Company announces a new heavy-duty, gas-powered compressor known as the "LVG." Designed to fill the growing need for large compact, four-cycle units, the LVG is built in 485 and 650 horsepower sizes using 6 or 8 V-type power cylinders. By using only two compressor frames on either size, the inlet, discharge and interstage piping and manifolding are simplified, and only two stuffing boxes are required.

The LVG incorporates overhead valves and

removable wet-type liners in the power cylinders. All auxiliaries, including the camshaft, the built-in recirculating water pump and auxiliary power take-off are driven from the flywheel end of the shaft, a feature promoting good governing and smooth operation.

Lubrication is full force-feed, with continuous oil cooling and oil filtration. Power pis-



Compact, V-type compressor.

tons have oil-cooled crowns. Governing provides for manual or automatic speed control down to half-speed.

The manufacturer supplies LVG compressors with suitable cylinders for pressures up to 5,000 pounds and for vacuum service. The V-type cylinder power end of these units is available also as a straight gas engine.

• Wire-Rope Clamp

The Safe-Line wire-rope clamp, manufactured and marketed by the National Production Company of Detroit has an inner surface that grips the wire rope and is double-spiral-splined to fit each strand and wire of the rope, thus making a perfect and secure grip on

Newly-designed wire-rope clamp.

each section of each wire and strand. The gripping halves of the clamp are held tightly to the rope by taper-threaded nuts. The Safe-Line clamp is made of high-tensile-strength steel and is guaranteed to outpull any wire rope made. Stock sizes are for ropes ⅛ to ¾ inches in size.

Unlike a spliced joint or zinced-in socket, a joint made with this clamp can be quickly readjusted to the proper tension without additional expense, and it can be used over and over again.

using lubricants for major types of machinery important to industry. Also included are tables and charts of considerable value for making volume and gravity corrections and viscosity index determinations.

DIESEL ENGINEERING HANDBOOK, *1939-1940 de luxe edition edited by L. H. Morrison. Published by Diesel Publications, 192 Lexington Avenue, New York. 971 pages. Price $6.00.*

About three years ago the first edition of this popular volume made its appearance. Since that time have occurred tremendous developments in the design and application of the Diesel engine and this outstanding new treatise is the result. There are thirty chapters covering the principle of this popular type of prime mover and its operation. A certain amount of data which appeared in the old edition has been retained because the information is extremely vital and unavailable elsewhere. Otherwise, it must be classed as an entirely new volume which the Diesel operator can scarcely do without.

Trade Literature

Diactor Generator Voltage Regulators. 16 p. *Synchronous Motor-Generator Sets.* 2 p. *Gas Absorbers and Vent Pipes for Pyranol Transformers.* 4 p. General Electric Company, Schenectady, New York.

The Safe-Line Wire Rope Clamp. 4 p. National Production Company, Detroit.

South Bend Lathes. 112 p. Catalog 100, South Bend Lathe Works, South Bend, Indiana.

Smith-Mobile . . . the Modern Truck Mixer and Agitator. 16 p. T. L. Smith Company, Milwaukee.

Constant Temperature Laboratory Equipment. 8 p. Precision Scientific Company, Chicago.

Diesel-Driven Compressors. 12 p. Chicago Pneumatic Tool Company, New York.

Texrope Drives and Lo-Maintenance Motors. 28 p. Allis-Chalmers Manufacturing Company, Milwaukee.

Bucyrus-Erie Draglines. 32 p. Bucyrus-Erie Company, South Milwaukee, Wisconsin.

Aftercoolers. 6 p. Pennsylvania Pump & Compressor Company, Easton, Pennsylvania.

Precipitron Electrostatic Air Cleaner. 24 p. Westinghouse Electric & Manufacturing Company, Cleveland.

Alligator V-Belt Fasteners. 4 p. Flexible Steel Lacing Company, Chicago.

Lancaster Mixers. 16 p. Lancaster Iron Works, Lancaster, Pennsylvania.

Reliance Road Building Maintenance and Quarry Equipment. 32 p. Universal Road Machinery Company, Kingston, New York.

Century Repulsion Start Induction Single-Phase Motors. 12 p. Century Electric Company, St. Louis.

Multiclone Dust Collectors. 16 p. Western Precipitation Corporation, Los Angeles.

Optical Pyrometer—Potentiometer Type. 16 p. Leeds & Northrup Company, Philadelphia.

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Recent Books

LUBRICANTS AND LUBRICATION, *by James I. Clower. Published by McGraw-Hill Book Company, 330 West 42nd Street, New York. 464 pages. Price $5.00.*

This book by Mr. Clower, who has written a number of informative articles on lubrication for PIT AND QUARRY, is essentially practical. It is for buyers and users of lubricants and for those who design and operate machinery. With the aid of it, every reader should be able to make reasonably accurate analysis of all equipment and properly select, apply, use and care for the lubricants that may be used most effectively with it. The book covers all the necessary fundamentals—types, sources, and properties of lubricants, lubrication systems, fundamentals of lubrication, etc.—and includes six chapters on definite methods of selecting and

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You Have a Date at St. Louis

No matter whether you produce sand, gravel, crushed stone, or ready-mixed concrete, you have a date at St. Louis in January . . . a date when your industry's leaders will gather in annual convention at the Jefferson Hotel to exchange views on economic, operating and legislative problems. All producers, irrespective of association membership, are invited to attend, to participate in the proceedings, to see and study the newest in machinery and equipment on display at the exposition held in conjunction with each convention listed at the left. Outstanding authorities on national problems will address you and you will long remember the top-notch entertainment features now being arranged.

Plan definitely to come by making your hotel reservations now! You will be amply repaid by the new knowledge you will acquire, by the valuable new contacts you will make, by the old friendships you will renew.

CONVENTION DATES

●

January 17, 18, 19—1940

Twenty-Fourth Annual Convention, National Sand and Gravel Association.

January 17, 18, 19—1940

Tenth Annual Convention, National Ready-Mixed Concrete Association.

January 22, 23, 24—1940

Twenty-Third Annual Convention, National Crushed Stone Assn.

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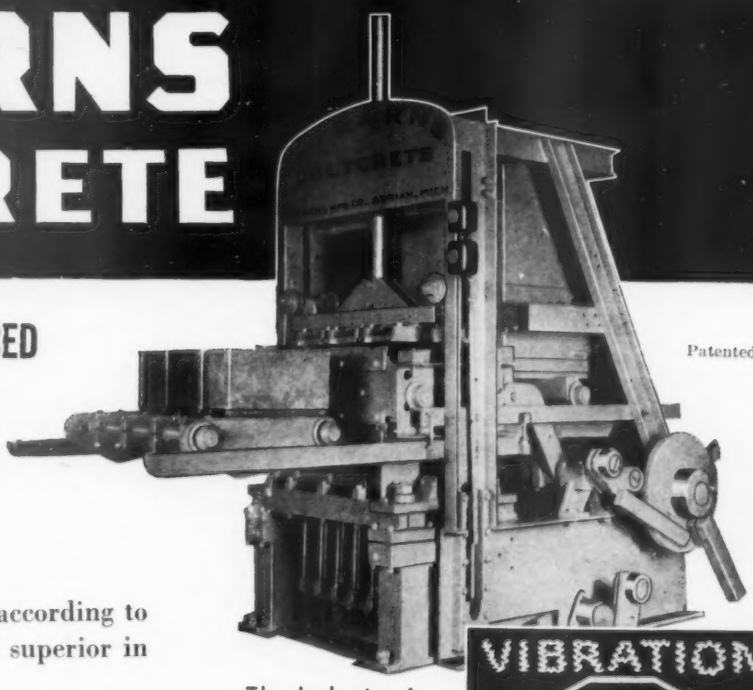
—THE MACHINE THAT PRODUCED THE VIBRATED UNITS FOR THE UNIVERSITY OF WISCONSIN COMPARATIVE TESTS . . . .

STEARNS Joltcrete-produced blocks, according to the official report* just released, were superior in these ways:

1. **Had higher early strengths.**
2. **Absorbed less moisture.**
3. **Showed less volume change.**
4. **Were lighter for *all* five of the lightweight aggregates used.**

In all tests made by disinterested parties—in all tests made by products manufacturers themselves—vibrated concrete blocks made on the STEARNS Joltcrete Machine have proved their superiority by a wide margin. They're the kind of blocks that your customers will buy in increasing volume. They'll build new business for you.

*"Tests on Concrete Masonry Units Using Tamping and Vibration Molding Methods," by Kurt F. Wendt and Paul M. Woodworth. Pp. 121-163, Journal of the American Concrete Institute, November, 1939.



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The Industry is cautioned against infringing machines.

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STEARNS Joltcrete is the *only* concrete block machine that vibrates the concrete in the mold box while the material is under pressure—*limited amplitude vibration.* There are vast differences in different forms of vibration. **Only STEARNS Joltcrete blocks have been proven!**

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Manufacturers of complete concrete products equipment.

The CONCRETE MANUFACTURER

December, 1939

A SPECIAL SECTION OF PIT AND QUARRY DEVOTED TO PRODUCTION MARKETING AND USES OF CONCRETE PRODUCTS AND READY-MIXED CONCRETE

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A. C. PETERSEN
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Tamping Affects Strength

In a paper entitled "Effect of Weight of Tampers and Number of Tamps on the Flexural Strength of Concrete Silo Staves," appearing in Volume 11, Number 1 of the *Journal of the American Concrete Institute,* 502 concrete silo staves were made at a commercial plant for the tests reported. The transverse strengths were determined for 324 of these staves. The chief variables were the weight of tampers and the number of tamps per stave. The number of staves per sack, the aggregate grading, and the consistency were also varied. For the materials and methods of manufacture used—

(a) Increasing the weight of the tampers from 50 to 75 pounds, increased the transverse strength, the increase varying both with the number of tamps and the mix.

(b) The transverse strength increased with an increase in the number of tamps from 2 tamps to 6 tamps. Beyond 6 tamps the effect on the transverse strength was influenced also by the mix and by the weight of the tampers.

(c) In nearly all cases staves made with 2 tamps of a heavy tamper were stronger than staves made with 6 tamps of a normal one.

(d) The thickness of tamped staves varied considerably. Hence, if the load per inch of width is to be used as a measure of quality, it should be corrected to correspond to a specified thickness.

The tests were carried on at the University of Minnesota coöperatively by the university, the U. S. Department of Agriculture, and the Minnesota Department of Conservation.

■

Aggregate from Slate

Waste slate resulting from quarrying and milling operations in the vicinity of Bangor, Pa., believed suitable raw material for the production of a lightweight aggregate, has been subjected to further tests during the past year by the U. S. Bureau of Mines. The chemical analysis shows it to contain about 54 per cent. SiO_2, 17 per cent. Al_2O_3, and 7 per cent. iron oxides, together with appreciable amounts of potassium, calcium, and magnesium oxides, thereby explaining the low temperature (approximately 1,150 degrees Centigrade) at which this material fuses. About 4 per cent. CO_2 and an additional 1.3 per cent. free carbon were found to be present also, constituents that no doubt assist greatly in the "bloating" phenomenon.

Tests show that the original slate of 2.8 specific gravity will expand more than five times its original volume and still possess a structure of fairly high compressive strength. In common with many similar phyllitic minerals, such as mica, pyrophyllite, and vermiculite, the expansion on bloating is normal to the cleavage planes.

Indications are that the simplest means of controlling the particle size of the "puffed" product would be to grind the relatively soft waste slate to fairly fine size and then form small pellets or aggregates by moistening with a suitable liquid and either nodulize or extrude the material preparatory to heating to effect expansion. Small granules of the desired sizes, having a cellular structure and a vitreous skin almost impervious to moisture, are obtained by this method.

■

To Study Efflorescence

A joint working subcommittee to consider and devise methods of test and requirements for masonry materials with respect to efflorescence has been appointed by vote of Committee C-12 on Mortars for Unit Masonry and Committee C-15 on Manufactured Masonry Units of the American Society for Testing Materials. Personnel of this joint group includes Frederick Heath, Jr., Colonial Clays, Inc.; F. O. Anderegg, Owens-Corning Fiberglas Corporation; J. M. Hardesty, Bell Telephone Laboratories, Inc.; and J. C. Pearson, Lehigh Portland Cement Company.

■

Market Stone-Faced Units

Macstone, concrete building units faced with Briar Hill sandstone, are being manufactured and marketed in northern Indiana by the firm of Linton & Truex at Elkhart, Indiana.

An R&L vibrating table, steel forms and an R&L stone splitter are used to produce the units at the plant. Gravel aggregates are employed in the mix.

Plant and yard of the Mortarless Masonry Corporation, Los Angeles.

"Mortarless" Concrete Blocks Resist Shock of Earthquakes

SOUTHERN California, in the minds of those familiar with it, has become synonymous with progress. This is especially true in the construction and related industries where new methods and products are not condemned because they are not used elsewhere. In the Los Angeles area the manufacture of concrete building units had gained some popularity when the earthquake of a few years ago sent existing building codes tumbling. This catastrophe resulted in a tightening of building codes which, in turn, has been responsible for many improvements in the design of concrete building units and their utilization in the construction of quake-proof buildings.

One of the leaders in this field is the Mortarless Masonry Corporation, which in 1935 built a plant at 3328 San Fernando Road, Los Angeles, to manufacture a patented mortarless building unit as well as standard mortar-type units. To make these products the company improved a block machine which had been developed some years earlier for the manufacture of mortar blocks. This machine is a light, inexpensive hand-operated press machine which easily produces 4 blocks per minute under ordinary conditions. The block is pressed first from the upper side with comparatively light pressure and then from the lower side with greater pressure, after which it is automatically pushed up out of the machine. This preliminary compression compacts the material to such an extent that the final compression stroke is very short, making it possible for the operator to exert great pressure with little effort. This patented double squeeze is adjustable to a limited degree in each machine and the amount of compression and travel varies with different types of aggregates.

The block made with this machine has straight lines and sharp edges. Clean, washed pea gravel and sand are used in about equal parts in a proportion of about 6 to 1 with Portland cement. A semi-dry mix is used with only enough water to wet the aggregate thoroughly. This results in a porous block with an average strength of 2,500 p.s.i. of net area. Local specifications require 2,000 p.s.i.

In this plant aggregates are dumped from trucks on two ramps to piles on the mixer level. A 2-bag mixer serves two machines, one for 6-inch and the other for 8-inch blocks. A 1-bag mixer serves a 4-inch and a 12-inch machine. A special machine for making mortar blocks and bricks can be moved in place of one of these. Each machine also makes all the special blocks to go with the "regulars." Simple attachments make possible the production of corner blocks, plain-end blocks, half-end blocks and patented bond-beam and corner bond-beam blocks. Using one machine with 2 men doing all the mixing, stripping, watering, etc., over 600 blocks are produced in an 8-hour day. With a full 5-man crew as many as 2,000 blocks have been made in 8 hours.

Each block is made on a separate cast-iron pallet on which it is stored indoors for 24 hours. Blocks are then stacked and kept continuously wet for at least 8 days, after which they are ready for use.

Deliveries are made from this plant to a distance of 40 to 50 miles in company-owned trucks. About 95 per cent. of the blocks produced in this plant are of the Mortarless type.

Although this plant has paid its way, it has been operated primarily as a demonstration plant to work out new ideas and to perfect the present technique. James W. Briscoe, owner of this company and inventor of the Mortarless block, believes in the gradual development and perfection of a product before going into large-scale production. Before any of its building units were sold on the open market the company first built a number of houses in order to become familiar with all the problems a builder might encounter in using this product. Since then over 200 houses and many other structures have been built of this Mortarless block in this area. It has gained special favor in the construction of garden walls. If de-

Some of the sizes and types produced.

James W. Briscoe, owner, and his son, James R., superintendent, pose before a built-up wall section.

sired the company will contract to erect the building. Where a customer prefers to build his own house, complete instructions are given or skilled men are

Filling the block machine.

supplied to do this work at reasonable wages.

It has been found that a building can be constructed of "Mortarless" blocks at a cost comparable to wood frame and stucco. This is possible to a large extent because unskilled labor is used almost entirely in building the walls. Savings are also made in cementing the window and door frames in position; because no lathing is required, only two thin coats of interior plaster are needed and only enough exterior stucco is used to adequately cover the wall. The use of pressed, porous blocks with extra large air spaces also eliminates sweating.

All the buildings are constructed with a Mortarless unit system of reinforced construction which meets all the stringent requirements for earthquake resistance in this area. Under this system, when pouring the concrete for the foundation, the first course of blocks is laid and grouted in the wet concrete, which is lined and leveled as it is laid. In residential construction exterior walls are built of 8-inch blocks and the partitions of 6-inch blocks. On the following day blocks are stacked dry up to the first wall level; window and door frames are built for all the corners and bond beams. The special patented bond-beam blocks are used over all doors and windows and around the tops of all building walls. The tongues and grooves on each block are so designed that the webs in the blocks must be over one another, forming 3½-inch by 5½-inch vertical cavities every 24 inches of wall length. Two ⅜-inch steel reinforcing rods are placed in each cavity. Concrete is then poured into the vertical columns and corners and around the doors, windows and bond beams in one operation, forming a monolithic reinforced structure. In this way every block is tied solidly into the wall with concrete. A 2-inch by 8-inch wood plate is bolted around the top, on the bond beam, of all exterior walls. Upon this any type or design of roof may be built.

Compressing the unit.

Interior plaster is applied directly on the blocks and the exterior may be given one or two coats of waterproof stucco followed by a waterproof brush coat. In many instances where a rougher appearance is desired two good waterproof brush coats are applied directly on the blocks.

In this section of the country basements are a rarity. Concrete floor slabs are poured to the desired thickness on a fill of sand and the surface is carefully finished in the desired finish and prepared for wax or polish. For wood floors 2-inch by 3-inch treated wood sleepers are embedded in the surface of the concrete slab, which is given a thorough coating of tar, asphaltum, mastic or some similar substance. The hardwood floor is then nailed to the sleepers.

Through an affiliate, the Mortarless Tile Machine Company, Incorporated, at the same address, this machine and the rights to manufacture Mortarless units are made available to other manufacturers. These machines are sold outright to anyone for the manufacture of standard building units or of any desired "specials". Mortarless concrete-block machines, however, are leased

A block being ejected.

with exclusive territorial rights, which assure the lessee an exclusive market and enable the company to maintain a reputation for high-grade products and construction which is necessary for success in the manufacture of this or any other type of concrete building unit. The Mortarless type of block and construction has been approved in every city where such approval has been sought and is now also being manufactured at plants in such cities as Fresno, San Diego, Bakersfield, Berkeley, Oakland, Glendale, Long Beach, etc., as well as in several cities in the East and Middle West. Machines for making mortar blocks have also been sold to many producers in all parts of the country. Three machines were recently shipped to the Sociedad Venezolana de Inversiones at Caracas, Venezuela.

CONCRETE MACHINERY DEALERS WANTED

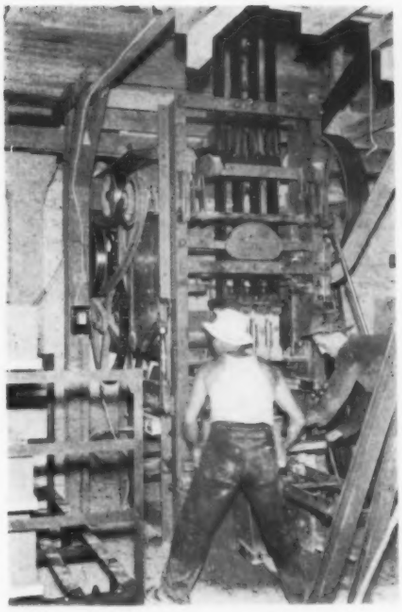
We frequently receive requests from concrete machinery manufacturers for live machinery dealers. If you want to handle any additional equipment advise us; or, if you have some special type of equipment you would like to handle let us know and we may be able to help you make connections.

PIT AND QUARRY PUBLICATIONS
538 S. Clark St. Chicago

By W. E. TRAUFFER

Stone Company's Subsidiary Produces Diversified Line of Concrete Units

Plant view with aggregates stock-piles in foreground. In background is the storage yard and the crushed-stone plant.



The new block machine.

Close-up view of the new machine with electrically-heated face plate used in working rock-face units.

A SUCCESSFUL business is generally considered to be one which keeps abreast or ahead of its field, developing new markets or products and adopting new methods as the opportunity presents itself, at the same time showing a profit. By this or any other standard the Lexington Concrete Products Company of Lexington, Kentucky, is a successful business. Much credit for its success belongs to J. L. Alloway who is in charge of concrete-products manufacture, promotion and sale. This company is a division of the Central Rock Company which, under the direction of T. W. Havely, president and general manager, has long been considered one of the most progressive aggregates-producing companies south of the Ohio River.

The history of this company is interesting. It was organized in 1929 as a division of the Central Rock Company which was organized at the same time. The original products plant was located about two miles from the crushed-stone plant. Concrete pipe and tiles and concrete blocks were made. In 1934 the pipe business and equipment were sold to the Kentucky Concrete Pipe Company and the block and tile equipment was moved to its present location at the quarry. A new plant was erected early in 1936 with the original equipment, and improvements were made from time to time since then. In 1939 a new block machine was added. Mr. Alloway has been with the parent company since it was organized and took over the management of the products business when this began to show promise.

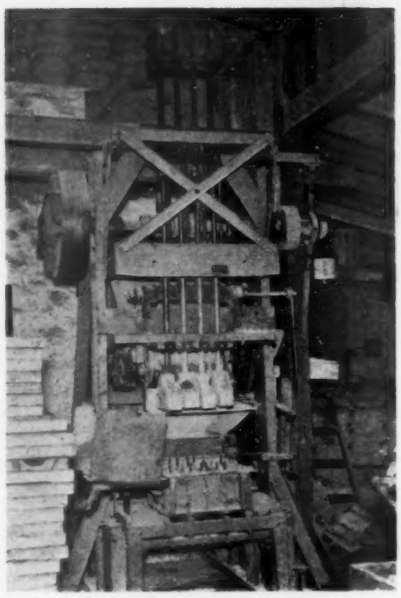
At first the company's products were confined to standard concrete and cinder blocks. Other products have been added from time to time. Now they include pre-cast and reinforced-concrete joists and floor slabs, wall and floor tiles, pre-cast lintels, fill-in bricks, load-bearing blocks and many other special blocks. Recently Superock lightweight slag aggregate was adopted as a third type of material. Superock blocks are now being sold mainly for back-up work and their high insulating value has been found to be an important factor in building up demand. The officials of the company believe that all-concrete houses are the best future market for concrete products, in this territory at least, and it is now in a position to supply everything needed for such houses. All the company's products are being sold under the trade name of "Lexco."

The company follows sales methods used by many other producers but goes farther than most. Prospects are obtained by advertising, by direct mail (using P. C. A. copy suggestions), personal contact, etc. These methods, according to Mr. Alloway, will uncover prospects but in order to sell many of them the producer must be able to give the prospect an estimate on a completed house. The material must be sold in place without the company's actually going into the construction of the house or other building. Mr. Alloway usually takes the prospect to any architect selected by the client and together they work up a plan and estimates. The prospect is then put in touch with contractors who can build for him. Supervision of the construction is done by the architect. In the case of low-cost houses, where no architect is employed, the company supervises their construction. However, the company does no contracting, as this would mean going into direct competition with some of its best customers. For the same reason it does not produce ready-mixed concrete, and no building materials other than those made in its plants are handled.

As has been the case in many other territories, there was at first considerable prejudice against all-concrete houses and this had to be overcome by steady educational advertising and promotion. A model house of moderate cost was built and, after a private showing to architects and contractors, this was thrown open to the public for inspection. This had the desired result, and now little prejudice against concrete is encountered. This house is now occupied by Mr. Alloway and his family. The development of this market has also made it possible for the company to bring the cost of an all-concrete house down to the same level as that of wood-frame and brick-veneer types, but not quite down to the straight-frame level. A total of 20 all-concrete houses have been built since the company began promoting them two years ago. Efforts are now being made to promote the same type of construction for commercial and public buildings.

It is evident that this company misses no bets in promoting the use of concrete products for all types of buildings. For example, a fireproof all-concrete tenant house, which can be built for only $2,100, was recently designed. This house meets the needs of large horse and cattle raisers in this area who have many tenants and employees to be housed. In promoting this house a letter with a photograph, description and plan was sent to every stockman in this area and many sales resulted. The design was found to be suitable also for low-cost private dwellings and is rapidly gaining in popularity. The accompanying reproduction of the circular sent out describes this house.

The company's sales efforts this year have been particularly directed at the back-up market. They have been successful in getting concrete masonry specified, either outright or as an alternate, on many projects where this material would ordinarily not have been considered.



Tamper weights, above, have increased capacities on the older machines.

A FIREPROOF TENANT HOUSE FOR ONLY $2100

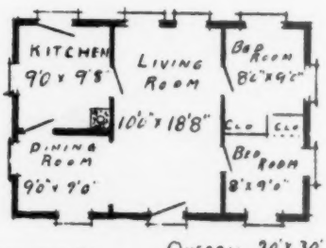
This absolutely fireproof tenant house has floor, walls, partitions and roof of fireproof concrete construction.

Durable Safe

Exceptionally comfortable, made so by the high insulation value of the cinder masonry walls and Celotex insulation on roof.

Features of this house are Steel Window Sash, exposed beam ceiling, beautifully colored floors, and durable built-up roofing. Interior and exterior finish is of Waitex paint, in your choice of colors.

FLOOR PLAN



Overall 20'x 30'

Bathroom and complete plumbing system may be added for $375. Electric wiring and fixtures will be added for $75. Price of $2100 includes erection anywhere in Fayette County. Slight additional transportation charge will be made elsewhere.

LEXINGTON CONCRETE PRODUCTS COMPANY
Old Frankfort Pike Phone 512
Lexington, Kentucky

Circular used by the company in promoting low-cost housing.

In building this plant advantage was taken of the topography to keep material handling at the lowest point. All the aggregates are stored in stock-piles on a higher level than that on which the products are made and stored. Those used include natural sand, Superock, and stone sand and screenings from the adjacent crushed-stone plant. Cinders, obtained from a neighboring distillery, are crushed and screened to ½ inch and under before using. This is done in a small plant with a jaw crusher, an elevator, a Robins vibrating screen and a New Holland roll-crusher.

Aggregates are wheeled in barrows fitted with Firestone pneumatic tires to either of two concrete mixers. An Ideal 14-foot mixer is used when making floor and bathroom tiles, reinforced floor slabs, lintels, etc., which are made on a small vibrating table of the company's own design. The tiles are being made by a process patented by the Superior Cement Corporation of Portsmouth, Ohio, using live-rubber molds made by the Oak Hill Rubber Company. Four tiles to a mold are made in sizes 3, 4, 6, and 12 inches square. Floor slabs are made 24 inches square and 2 inches thick. There are also special trim molds for tiles and other "specials." Wall tiles are ⅝ inch and floor tiles ⅞ inch thick and are made in many solid colors or color combinations.

When a solid-color tile is being made, the color is mixed with cement and quartz sand and troweled into the mold

to a depth of ⅛ inch for small tiles and ¼ inch for the larger tiles and floor slabs. When variegated colors are wanted these are filled in. The mold is then vibrated on the table until the mixture is free of air bubbles. Concrete is then poured in to the required depth. For the smaller tiles stone sand is the only aggregate. In the larger tiles and slabs ½-inch stone chips are also used. The vibration then continues until all the air bubbles have disappeared. A wooden float is then used to finish off the surface. Curing is done overnight by covering these units with a tarpaulin and steaming them.

High-early-strength cement is used exclusively in making these products as it reduces the number of pallets required and reduces breakage and chipping of the corners of the tiles and slabs.

The floor slabs lend themselves particularly well to modern interior decoration along with the pre-cast joists. They are made without coloring where they are to be covered with tile or other material. Colored slabs used without other covering can be waxed like any hardwood floor and present an attractive appearance. The wall and floor tiles have also been given a favorable reception and in several of the concrete-masonry houses so far built by the company pre-cast slabs, and floor and wall tiles have been used.

An Ideal 21-foot mixer supplies concrete for the other products. This mixer is movable on rails so that the concrete can be discharged into any one of three hoppers. Two of these hoppers feed Anchor block machines and the third the new stripper. The latter machine was being used to make natural-face blocks at the time of the writer's visit. When making these, the natural-face plate is at the back and does not rise with the remainder of the form. This plate is electrically-heated to prevent the concrete from adhering to it and to insure perfect faces on the blocks.

Workmen dumping aggregate into 21-cubic foot mixer for block and joist machines.

One of the many fine residences which have been erected using "Lexco" products throughout.

Interior view of the house. Walls are of exposed masonry, brown mottled floor tiles are superimposed on concrete joists. The ceiling joists are exposed.

Wooden pallets are used and the blocks are transferred to racks on rail cars with a capacity of 50 blocks each. A loaded car is rolled on a cross transfer car, from which it is rolled into the curing room or kiln. This room holds a total of 30 cars, or 1,500 blocks. Canvas is hung over the ends of the kilns and steam pipes on the floor supply both heat and humidity. The blocks are left in the kilns for 14 hours before they are moved out of doors, where they are spray-cured for 7 more days. There is outdoor storage space for about 90,000 blocks. Steam for curing all the products is supplied by a 35-horsepower boiler.

The new stripper is ordinarily used to make plain or natural-face blocks, but with the proper stripper heads and mold boxes it can be used to make anything from concrete bricks up to 8- by 12- by 18-inch blocks. This machine averages about 1,200 plain blocks in an 8-hour day. When operating at capacity one man tends the mixer, one operates the machine, one bears off the blocks, and one takes care of storing.

The Anchor machines are ordinarily used for making foundation blocks. One of them has been speeded up by putting 65-pound weights on the top of each of its four tampers. The added weight reduces the number of tamps necessary for each block and increases the capacity of the machine about 25 per cent. To support this extra weight the regular tamp rods have been replaced with stronger rods.

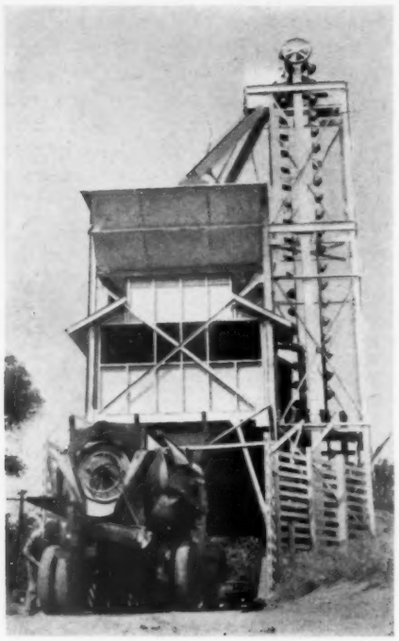
The joist machine was made by the company and is similar to machines in general use. In one operation it will make ten joists up to 20 feet in length. Metal cores all used and these are held in place with clamps. The joists are made late in the afternoon and left in the molds overnight. In the morning they are removed from the molds to a long table and are covered with a tarpaulin. After steaming for 24 hours they are moved to storage for further curing. A power-driven wire brush suspended from an overhead monorail is used to

(Continued on page 73)

Ready-Mix Plant Uses Surplus Concrete for Foundation Posts

● By HARRY F. UTLEY

Two views, left and below, of the ready-mixed-concrete plant of Transit-Mix Concrete Company, Owensboro, Kentucky.



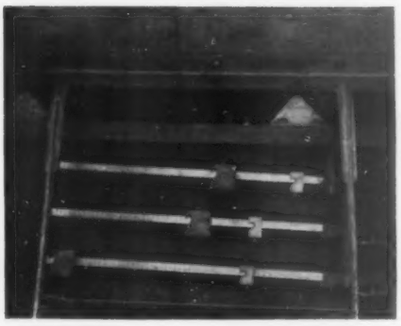
THE economic advantages of central-mixed concrete were discovered by the road-building industry and, through the development of ready-mixed-concrete production to a controlled science, a large portion of the output is used in street and highway construction and maintenance. So it was, perhaps, natural that the opportunity to establish a ready-mixed-concrete business in Owensboro, Kentucky, a city of about 30,000 population, was recognized and acted upon by a well-known firm of road builders, Robinson-Gregory & Company, whose headquarters are there. Just about a year ago a subsidiary concern, the Transit-Mix Concrete Company, was formed and a plant erected on a carefully chosen site which is almost exactly in the center of a 2-mile circle which encompasses the city. As a result the average haul is not more than a mile, delivery costs are held to the minimum and the three truck-mixers now in service are able to handle almost any job without delay between batches. There have been longer hauls, of course, the maximum having been 21 miles, and considerable yardage has been mixed and transported to the oil fields 10 or 12 miles distant, but 80 per cent. of the company's business is local and consists mainly of foundation, floor and sidewalk concrete.

When operations began sales were in the neighborhood of 100 cubic yards monthly. As contractors and architects became more familiar with the quality of the concrete being produced and its ready availability, the output increased and by this summer had reached 400 cubic yards per month, culminating in a "peak" production in September, 1939, when concrete deliveries for the month totaled slightly more than 1,000 cubic yards.

The proportioning plant is a standard, all-steel Blaw-Knox installation complete with a three-compartment aggregates hopper, a three-beam weighing batcher and an aggregates elevator. A frame structure partially incloses the loading plant with a concrete-paved driveway extending through on the ground level for the truck-mixers and cement-storage space on the second floor. Cement, purchased in paper bags from the Kosmos Portland Cement Company, is received in railway cars and carried to the cement-storage room by a Barber-Greene cleated-belt con-

One of the three 1½-cubic yard truck-mixers now operating out of the plant.

Surplus concrete brought back in the truck-mixers is used to cast these foundation posts which are sold for 40 cents each to building-supply dealers.

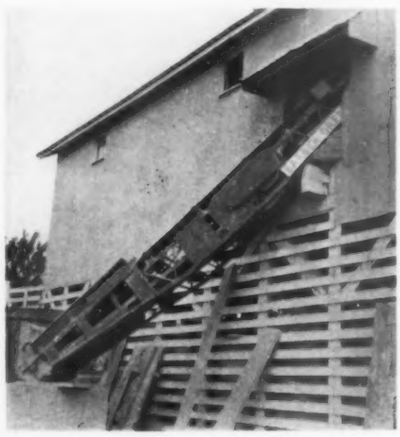


The three-beam weighing batcher.

veyor. The room has a capacity of two carloads of cement.

At the beginning of production, mixing and delivering were handled by two 1½-cubic yard Blaw-Knox Trukmixers mounted on General Motors cab-over-engine chassis. Early this year another Trukmixer of the same capacity was purchased, the new one being mounted on a cab-over-engine Chevrolet.

The aggregates are obtained exclusively from the yard of the River Sand & Gravel Company, a haul of exactly



Short belt-conveyor which carries sacked cement from cars to storage.

1.2 miles. No stock-piles are maintained, dump trucks being dispatched for the aggregates as needed, the aim being to keep the hopper as nearly full as possible at all times.

Any surplus concrete brought back by the truck-mixers is used to make concrete-footing units for buildings for which there is considerable demand in that area. Wooden forms are used to cast these foundation posts, which are 8 by 8 by 24 inches in size. The company sells these for 40 cents each to building-supply dealers and thus realizes about $12 per cubic yard for concrete disposed of in this manner. Costing the user little more than timber footings, the advantages of these units, because of their resistance to rot, fire and termites, are readily apparent.

The company is experimenting with a new venture, the casting of concrete slabs on the job for erecting small residences by the "tilt-up" method. In cooperation with the Portland Cement Association, it has designed a one-story duplex rental house, each family unit consisting of a living room, bed room and kitchen-dinette that can be constructed easily by the tilt-up method and sold for the very low price of $2,500.

Lexington Concrete Products

(from p. 71)

clean the cores. With it one man can do the job in 1 hour compared to 3 hours for each of 2 men when hand brushes were used. A portable flat-bed saw is used for cutting wooden forms and pallets. This can also be fitted with an abrasive wheel for cutting joists, tiles, and other masonry units.

Every possible precaution is taken to insure uniformly high-grade joists. Reinforcing is done as recommended by the P. C. A. High-early-strength cement is used and the concrete designed for 3,000-pound strength actually averages about 4,500-pound. High-early-strength cement is also used for all "specials" to insure a quick turn-over.

In making standard blocks a 1:6:3 mix is used, including straight-line stone sand and ½-inch limestone chips. About 25 blocks are made from one sack of cement. When making face blocks, some river sand is mixed with the limestone sand. The standard blocks weigh 44 pounds each and test from 1,100 to 1,200 p. s. i. under compression at 7 days. The cinder blocks weigh 31 pounds each and the Superock blocks 28 pounds each and both test about 1,000 p. s. i. A close check is kept on the proportions of all the ingredients to insure uniform quality. Compression and absorption tests are made at regular intervals in the new testing laboratory of the University of Kentucky at Lexington.

The Central Rock Company's crushed-stone plant is as newsworthy as the concrete-products plant and several articles have been published in PIT AND QUARRY describing it. The major product of this plant is commercial crushed stone but special sizes are also made for concrete products, concrete pipes and for asphalt-pavement retread work. In recent years the demand for stone sand and agricultural limestone has increased rapidly and these now account for about one-fourth of the total output of 1,000 tons daily. Recently a dust-collector of the company's own design was installed and the extremely-fine dust collected is sacked and sold for mixing with various types of live-stock feed.

Ruling Has No Effect on Ready-Mix Industry

On November 1 the newspapers incorrectly stated that a jurisdictional ruling by the American Federation of Labor, involving the settlement of a conflict between engineers and teamsters, had settled the question which arose in Washington as to which of these two unions had jurisdiction over the driving and unloading of ready-mixed concrete trucks.

According to Executive Secretary V. P. Ahearn, the National Ready Mixed Concrete Association is authoritatively advised that the jurisdictional ruling in question had no bearing whatever upon the ready-mixed-concrete industry, but was the outgrowth of a dispute between the teamsters and the engineers as to which of these two unions had jurisdiction over certain phases of actual highway construction, particularly in the bituminous field.

In carrying the story on this ruling, the newspapers, quite naturally it appears, accepted it as embracing the ready-mixed-concrete industry. But inquiry at the offices of the American Federation of Labor brought a statement from John P. Coyne, president of the Building and Construction Trades Department, that this was not the case. Mr. Coyne stated that the question as to which union had jurisdictional control over the operation and unloading of ready-mixed-concrete trucks was settled definitely at a meeting of the Executive Council of the American Federation of Labor held in Miami from January 24 to February 8, 1938, when the following action was taken:

"That in order to prevent any future doubt as to the jurisdiction of the trucks, vehicles or motor conveyances, hauling the materials, wet or dry, composing ready made concrete, it is hereby decided by the Executive Council that such hauling and unloading comes under the jurisdiction of the International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers of America."

Mr. Coyne further stated that this action of the Executive Council was ratified at the annual convention of the American Federation of Labor held from October 3 to 13, 1938, at Cincinnati, Ohio. Mr. Coyne emphasized that under these circumstances no committee of the American Federation of Labor could change the jurisdiction of the teamsters over the driving and unloading of ready-mixed-concrete trucks. Accordingly, the recent ruling does not have any relation whatever to the difficulties which arose in the District of Columbia and which led eventually to Federal indictments referred to in the article on page 27 of the November issue of PIT AND QUARRY.

Test Results of Concrete Units Made on Vibration and Tamping Machines*

WHICH method of molding is most satisfactory—tamping or vibration? What about the yield per sack of cement? Which lightweight aggregate should I choose? Does high strength assure high durability?

Problems such as these have confronted concrete-products plant operators to an increasing extent in the last year or two, and there were no definite general answers. Now, with the completion of a series of tests at the University of Wisconsin, producers have something tangible upon which to base their decisions. The tests, sponsored by the university in coöperation with the National Concrete Masonry Association, took more than a year to complete.

The vibrated units were made on a Stearns Joltcrete machine at the plant of the Midwest Concrete Pipe Company while the tamped blocks were made on two power strippers in the Best Block Company's plant in Milwaukee.

Seven aggregates were used including sand and gravel, crushed limestone, Pottsco, Superock, Waylite, Haydite and cinders. The cement was a blend of four different brands.

In proportioning, fines ranged between 40 and 60 per cent. Batches were designed to produce 45 blocks with 1¼ inch face shells and 45 per cent. core area. For the five lightweight aggregates, all the aggregate and from ½ to ⅔ of the water were mixed for 3 minutes in spiral-blade mixers of 28 cubic feet capacity. The cement was then added with the balance of the mixing water, and mixing continued for 5 more minutes. For the two heavyweight aggregates all the materials were combined and then mixed for 5 minutes.

Compression, absorption, volume-change, freezing-and-thawing tests were carried out in the manner prescribed by A. S. T. M. and Federal specifications.

In every case, yields closely approached the 17, 25, and 33 units per sack for which the mixtures were designed. Absorptions for all mixes were below the permissible limits but strengths in a number of cases dropped below the required 700 pounds per square inch.

Cinder Units.—All cinder units passed the requirements of the specifications but only those from which the yield was 17 blocks per sack stood up under the freezing-and-thawing tests to win ratings above "failure." Vibrated units were lighter, stronger and absorbed less water than tamped units, in general.

Haydite Units.—These passed the Federal and A. S. T. M. specifications by a good margin. Vibrated units were somewhat lighter, stronger and absorbed less moisture than those made by tamping, the effect being most pronounced in the richer mixtures. All withstood 100 cycles of freezing and thawing with little damage, indicating excellent durability. The tamped units in the 33-unit-per-sack mixes showed a remarkable gain in strength, however, passing those of the vibrated mixtures during freezing and thawing, the reverse being true for the two richer mixtures.

Limestone Units.—The crushed-stone units all exceeded the minimum requirements of the specifications; satisfactory durability in the tamped mixes having been obtained only in the rich-mixture range, however. This was believed partly due to some unsoundness in the particular aggregate used. Vibrated units did not behave especially well either, having been made extremely dry to overcome the stickiness which occurred with normal water contents. The resulting textures were coarse and the void percentage high.

Pottsco Units.—The 33-unit-per-bag mixes failed to pass the strength requirements. Vibrated Pottsco blocks were considerably lighter than the tamped specimens, had slightly greater strength and showed less absorption. The rate of absorption values were essentially the same for the three vibrated mixes and the leanest tamped mix. For the two richer tamped mixes, however, these values were considerably lower and the ratio of strength after 100 cycles of freezing and thawing to the strength of the control specimens was above unity in both instances.

Sand-and-Gravel Units.—All were well above minimum requirements of A. S. T. M. and Federal specifications. Vibration produced denser and stronger units than those made by tamping. All rated "excellent" for their general durability during the freezing and thawing tests, with no disintegration and practically no spalling.

Superock Units.—All tamped units and all except the leanest vibrated mix passed the standard strength requirements. The vibrated units were somewhat lighter, but from the viewpoint of absorption and strength there was practically no difference. Durability during the freezing-and-thawing program was excellent, with one exception for each type of molding method.

Waylite Units.—Only the leanest-mix vibrated units failed to pass the minimum requirements of Federal and A. S. T. M. specifications. Strengths were approximately the same for the rich mixtures but tamped units were superior in the leaner mixes. The tamped units had the highest durability ratings and, in general, absorbed less water although the correlation was not as apparent as for certain other aggregates.

General.—"The specific weight of concrete in all instances decreased as the mixes became leaner. Tamping, except for sand and gravel, produced somewhat denser concrete than did vibration, the average specific weight considering all mixes and aggregates being about 4 per cent. higher. On the other hand, the tamped units absorbed more water except for Superock, where absorptions for both methods of placement were equal, and for limestone, where the vibrated mix was not satisfactory. In all cases the absorption increased as the mixes became leaner, but in no case did the total absorption exceed 14.8 pounds per cubic foot of concrete—under the 15 and 16 pounds per cubic foot permitted in the governing specifications.

"Volume changes closely followed changes in moisture and for equal moisture contents were proportional to the cement content. Tamped units exhibited slightly greater volume changes than did vibrated units except for Haydite where no essential difference was noted. This was generally most marked in the leanest mixes. A second cycle of wetting caused the richest mixes for each aggregate to expand to almost the same extent as initial wetting. The lean mixes, on the other hand, expanded to a smaller degree. finally showing shrinkages from original values which made the total volume change of about the same magnitude as obtained for the first wetting cycle."

At the age of 7 days, vibration methods produced stronger units than did tamping in 14 out of 21 mixtures, the average strength being 5½ per cent.

* A digest of a paper by Kurt F. Wendt, assistant professor of mechanics at the University of Wisconsin, and Paul Woodworth, Portland Cement Association engineer, *Journal of the American Concrete Institute*, November, 1939, pages 121-163.

greater. But at 28 days, the average strength was 4 per cent. greater in favor of tamping. Vibrated units at 6 months, on the other hand, were 9½ per cent. stronger. It is pointed out by the authors, however, that had limestone as an aggregate been excluded, these average strength percentages would have been 9, 1 and 16½—all in favor of vibration.

"Seven- to 28-day strength ratios were 0.78 for tamped and 0.85 for vibrated units, the latter gaining a much larger proportion of strength at an early age than the former. After 5 months additional laboratory storage in ordinary air, the average strength of the tamped units had not changed materially. The 7- to 170-day strength ratio dropped to only 0.77. In 4 instances there were strength decreases over 10 per cent. compared with 28-day values, occurring for the leanest cinder and Superock mixes and both leaner Waylite mixes. This condition did not develop with vibrated units, although the leanest Waylite and Superock units lost slightly in strength, and as a consequence the 7- to 170-day strength ratio for all vibrated mixes dropped to 0.78. While little strength gain after 28 days is to be expected for units cured and stored as in this program, neither are large strength losses; but no apparent reason can be supplied for the unusual behavior in the 4 cases especially noted above.

"For the few mixes where serious spalling occurred in the tamped units during the durability tests it began in the face shell immediately adjacent to the junction of the face shell and one of the webs. The action was then progressive through the web and one-half of the exposed face before serious attack occurred in the other half of the unit. It was not possible to determine whether this defect always occurred in the same position of the unit as manufactured or not, but if this was the case, the failure could possibly have been due to minor misadjustment of feed or tamping action.

"A peculiar type of failure was noted for the two leaner vibrated mixes of all slag aggregates. Fairly early in the program, the exact time depending upon the strength of the unit, face-shell cracks were noted which progressed through the unit, and finally resulted in the spalling off of the entire face to approximately one-half the thickness of the face shell. No satisfactory explanation for this behavior has appeared, the condition being limited to slag aggregates and vibrated units and not being apparent in any tamped block nor any aggregate other than slag."

Table I lists a general summary of durability ratings, mixtures being arranged in order of compressive strengths after 100 cycles of freezing and thawing. The mix numbers in the first column may be interpolated as follows: the first letter indicates the type of aggregate—G, sand and gravel; L, limestone; H, Haydite; C, cinders; S, Superrock; W, Waylite; P, Pottsco. The second letter "T" indicates tamping and "V" vibration. The figure following—1, 2, or 3—indicates the mixture, "1" being the richest, or 17 units per sack; "2" being 25 units per sack; and "3" the leanest, or 33 units per sack. For example, "PV2"indicates a Pottsco vibrated block on which the yield was 25 per sack of cement.

Conclusions.—Bearing in mind that the tests were confined to but a single grading for each aggregate, and that natural aggregates from only one source for each were used in the program, the authors reach the following conclusions:

1. For equivalent yields with the same aggregate, vibration produces units which have higher early strengths and absorb slightly less water than does tamping. The units produced by vibration are also lighter except for the sand-and-gravel mixes.

2. Compressive strength and specific weight decreased and absorption increased as yield in terms of units per sack of cement increased in approximately linear relationship for each individual aggregate in the program.

3. The thermal-expansion coefficient per degree Fahrenheit varied with the type of aggregate from a low of .0000021 for cinders to a high of .0000055 for sand and gravel. In general, there is no marked difference in the coefficient for different yields with the same aggregate or for method of molding.

4. Volume changes closely follow changes in moisture and are essentially proportional to the cement content.

5. Tamped units in most instances exhibit slightly greater volume changes than do vibrated units for equivalent changes in moisture.

6. A larger proportion of the tamped units than of the vibrated proved durable under 100 cycles of freezing and thawing.

(a) With yields of 17 block per sack, 13 of 14 mixes (6 vibrated and 7 tamped), produced satisfactory durability ratings.

(b) With yields of 25 block per sack, 7 of 14 mixes (2 vibrated and 5 tamped), received fair, or better, durability ratings.

(c) With yields of 33 block per sack, 6 of the 10 mixes with strengths over 700 pounds per square inch, (2 vibrated and 4 tamped), produced durability ratings above failure.

TABLE I—GENERAL SUMMARY OF DURABILITY RATINGS

Mix No.	Compressive Strength				Absorption		Weight Change After 100 Cycles (*Per Cent.*)	Durability Rating
	Lb. per Sq. In.		Ratio		Lb./Ft.³ 24 Hours	Ratio ½ Hour / 24 Hours		
	After 100 Cycles	At 28 Days	100 Cycles / 28 Days	100 Cycles / 170 Days				
GV1	3580	3800	0.94	1.02	5.2	0.54	+0.4	Excellent
GV2	2820	2360	1.20	1.02	6.5	0.88	+1.1	Excellent
GT1	2820	2540	1.11	0.98	7.4	0.79	+0.8	Excellent
LT1	2190	1940	1.13	0.93	11.9	0.64	+0.7	Good
GV3	2100	1600	1.31	1.10	6.9	0.91	+1.1	Excellent
HV1	2100	1810	1.16	1.00	7.9	0.59	+1.0	Excellent
HT1	1980	1450	1.36	1.29	12.1	0.64	+1.6	Excellent
GT2	1880	1800	1.04	0.96	7.6	0.82	+1.0	Excellent
CT1	1880	1610	1.16	1.22	11.3	0.72	+0.1	Excellent
ST1	1800	1200	1.49	1.46	11.6	0.69	+1.1	Excellent
WT1	1380	1220	1.38	1.44	11.5	0.81	+1.4	Excellent
PT1	1620	1210	1.34	1.23	13.2	0.67	+1.1	Excellent
CV1	1590	1680	0.94	0.84	10.0	0.86	+1.6	Good
HV2	1480	1280	1.16	0.97	13.1	0.87	+2.1	Excellent
PV1	1440	1210	1.20	0.92	11.9	0.88	+1.3	Excellent
GT3	1440	1140	1.26	1.31	8.4	0.91	+1.1	Excellent
HT2	1360	1170	1.16	1.24	13.6	0.72	+1.2	Excellent
HT3	1340	970	1.39	1.34	14.2	0.76	+1.9	Excellent
ST2	1340	930	1.44	1.56	14.3	0.79	+0.7	Excellent
SV1	1290	1220	1.06	0.96	11.9	0.87	+1.3	Excellent
HV3	1250	1150	1.09	0.89	13.7	0.84	+1.1	Excellent
PT2	1190	890	1.34	1.08	13.8	0.74	−7.8	Fair
WT2	1120	990	1.13	1.41	11.9	0.84	+0.8	Excellent
WV1	1060	1180	0.90	0.87	11.0	0.85	+1.3	Good
WT3	980	920	1.08	1.55	12.7	0.85	+1.3	Excellent
ST3	700	740	0.95	1.07	14.8	0.85	−12.2	Fair
LV1	700	1180	0.59	0.44	13.4	0.91	−20.1	Failure
CT2	640	970	0.66	0.55	12.2	0.90	−24.5	Failure
PV2	480	940	0.52	0.40	13.2	0.89	−47.3	Failure
SV2	440	740	0.59	0.52	14.6	0.90	−38.0	Failure
LT2	220	930	0.23	0.17	12.6	0.91	−81.0	Failure
CV2	0	1040	0	0	12.1	0.88	−36.4*	Failure
LT3	0	920	0	0	12.1	0.88	−60.6*	Failure
LV2	0	830	0	0	14.0	0.92	−66.6*	Failure
WV2	0	780	0	0	12.4	0.93	−72.5	Failure
CV3	0	730	0	0	12.1	0.88	−38.6*	Failure
LV3	0	720	0	0	13.5	0.92	−82.9*	Failure
CT3	0	700	0	0	12.9	0.92	−47.1*	Failure
PT3	610*	660	0.92*	0.69*	14.3	0.84	−19.1*	Failure
SV3	410*	660	0.62*	0.70*	14.2	0.92	−41.9*	Failure
PV3	270*	600	0.45*	0.42*	14.2	0.89	−37.7*	Failure
WV3	0*	580	0*	0*	12.8	0.90	−50.6*	Failure

*After 50 cycles of freezing and thawing.

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7. The average strength after 100 cycles of freezing and thawing for the 26 mixes which rated above failure was 18 per cent. higher than the 28-day strength and 14 per cent. higher than the strength of the control specimens tested at a comparable age.

8. On the basis of these tests good or excellent resistance to 100 cycles of freezing and thawing is assured if the units show no weight loss at the end of 50 cycles.

9. Present specifications of 700 pounds per square inch compressive strength at 28 days and a maximum absorption of 15 or 16 pounds per cubic feet of concrete are inadequate to insure masonry units which will be sound and durable under severe exposure conditions.

10. There is no apparent correlation between absorption *per se* and durability. Rate of absorption, however, expressed as the ratio of absorption after ½ hour immersion to absorption after 24 hours immersion in water, shows promise as a criterion for durability rating.

11. A satisfactory specification based on these tests which insures excellent resistance to freezing and thawing for light weight aggregates is a compressive strength at 28 days of 900 pounds per square inch based on gross area and a rate of absorption not in excess of 0.87. The latter measure, however, requires further confirmation before it can be recommended for use in specifications.

12. A minimum compressive strength of 1,000 pounds per square inch of gross area is recommended for load-bearing units as the simplest and most equitable specification for insuring reasonably satisfactory behavior under severe exposure conditions.

13. Unsound aggregates, as evidenced by the particular limestone used in these tests, cause unsatisfactory behavior of units under severe exposure despite conformance to reasonable initial strength specifications.

14. Further studies should include the effect of differences in the proportion of aggregate passing the 50-mesh sieve on absorption rate, strength and durability; and possible correlation of various methods of determining absorption rate with strength as a measure of durability.

For expanded slag aggregates, the effect of variations in the methods of vibration molding and the influence of variations in grading on durability should also be investigated in the opinion of the authors.

Engineers, concrete technicians and operators wishing to obtain a more detailed report of the investigation including tabulations covering physical data and batch details, charts showing the findings for each type of aggregate, and photographic reproductions of specimens after 50 and 100 cycles of freezing and thawing should consult the November, 1939 issue of the *Journal of the American Concrete Institute*.

According to Harvey Whipple, secretary of the Institute, the report is also being made available in separate reprint form.

Lightweight Sand-Lime Blocks May Appear

Experiments are being carried on at the plant of the Northern Indiana Brick Company at Mishawaka, Indiana, to produce lightweight sand-lime blocks. At present, tests are being made using Pottsco aggregate in combination with sand, lime and Portland cement, the product being cured in Jackson & Church cylinders under high-pressure steam. The Jackson & Church stripper now used to make regular sand-lime blocks will be used to form the units.

The company has been in the sand-lime-brick business for over a quarter of a century. For making repairs about the premises and for fabricating equipment for use in the plant, a Commonwealth 440-volt, 300-ampere alternating-current arc welder has just been installed.

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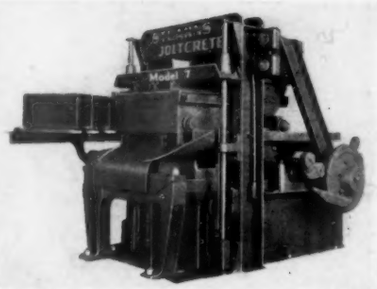

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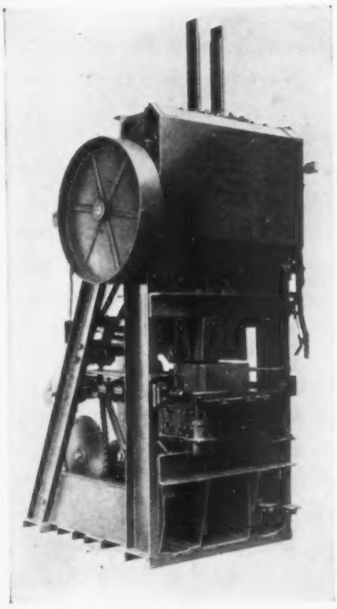

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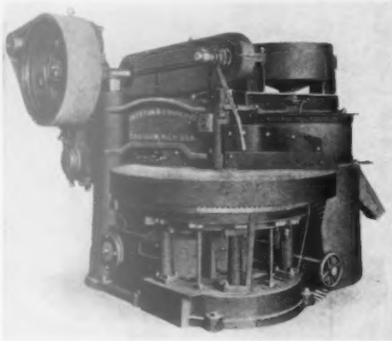

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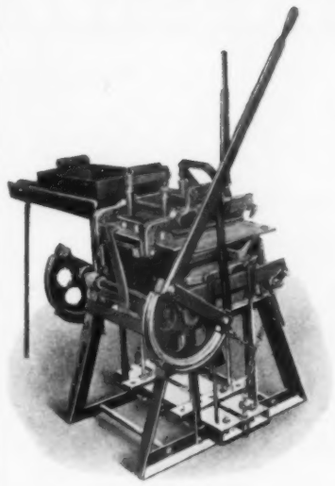

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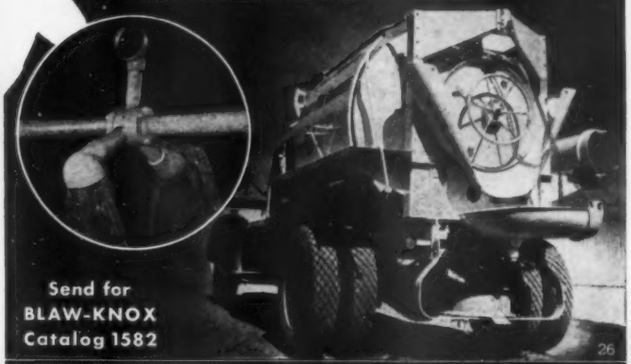


Send for BLAW-KNOX Catalog 1582

BLAW-KNOX BLAW-KNOX DIVISION OF BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.

Agitators and **TRUKMIXERS**

The CONCRETE MANUFACTURER

MANUFACTURING OPPORTUNITY

FOR AGGREGATE PRODUCERS — One that is complete and proven — Successful in many other aggregate plants. Ready for you to cash in big on the wide building upturn under way and the definite trend to more permanent, lower cost production.

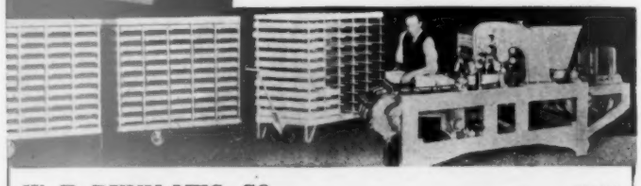
THIS OPPORTUNITY offers attractive earning power and future. Present manufacturers have proven and pioneered the way for you by establishing substantial businesses of their own. Today millions of products have been manufactured, thousands of buildings have been built with this material.

THIS OPPORTUNITY is the result of exclusive line production machinery which we will furnish. With it, plus other exclusive advantages, you will be able to supply the entire building trade with more attractive and permanent construction with savings at every step, from manufacturing to the completed job.

YOU WILL BE SUPPLIED with new processes, and formulas to enable you to manufacture products in 40 beautiful colors, shades and textures, using your surplus aggregate. Your product will be capable of meeting all known building requirements.

YOU WILL BE GRANTED manufacturing franchise covering your locality, protecting your market, business and future, with available engineering and advertising service for early expansion of your business.

YOU SHOULD INVESTIGATE while your territory is still open. Arrange to visit the nearest manufacturer and talk to the owner about this outstanding opportunity. So fill in coupon today. Perhaps the first step to a successful, profitable enterprise for you.



W. E. DUNN MFG. CO. 11-39
420 W. 24th St., Holland, Michigan

☐ Show me through your free books all about this outstanding and complete manufacturing opportunity for me in this territory.

☐ How I can visit a nearby manufacturing plant and see how better buildings are being built for less with your new material.

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Address _____

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Stepping Ahead in TRUCK MIXER DESIGN

Old style, hatch-loading Smith Truck Mixer — predecessor of SMITH-MOBILE.

•

New model SMITH-MOBILE — 4 yard size as a truck mixer; 6 yard agitator.

FOR YEARS, truck mixer operators have been trying to get away from leaky and tiresome loading hatches, troublesome rear discharge doors, clogging water bells and inefficient low discharge. Now, the modern SMITH-MOBILE eliminates these disadvantages and includes many exclusive, time-tested features that make for more efficient and convenient operation. Available as truck mixer in four sizes: 1½, 2, 3 and 4 yds.; as agitator, 2½, 3½, 5 and 6 yds. Built and guaranteed by SMITH — concrete mixer manufacturers for more than 40 years. Why not get the complete SMITH-MOBILE story?

EXCLUSIVE SMITH-MOBILE FEATURES

1. HIGH DISCHARGE — 27" to 34" higher than old-style truck mixers. No hoist or ramp required.

2. CONTROLLED DISCHARGE — pour it fast or slow. The concrete comes out in a smooth steady flow and without segregation.

3. VISIBLE MIXING — Open the door and look into drum while drum is revolving. Watch the mix. SEE what's going on.

4. FEED CHUTE CHARGING —Loaded on the level, no ramp needed. Easy to spot under bin.

5. DRUM REVOLVES WHILE CHARGING — Shrinking and mixing start instantly. Carries larger loads.

6. NO LOADING HATCHES to open or close. Driver can stay right in cab.

7. NO LEAKY TROUBLESOME DISCHARGE DOOR— Closing door on Smith-Mobile can be kept open during mixing cycle.

8. WATER INTRODUCED THROUGH CHARGING OPENING — Water nozzle located in top part of drum, well above concrete. High pressure pump furnished as regular equipment.

9. STEEP DISTRIBUTING CHUTE FOR DRY CONCRETE — Will spout dry concrete directly into high forms, buckets, concrete carts, etc., without pushing it down chute.

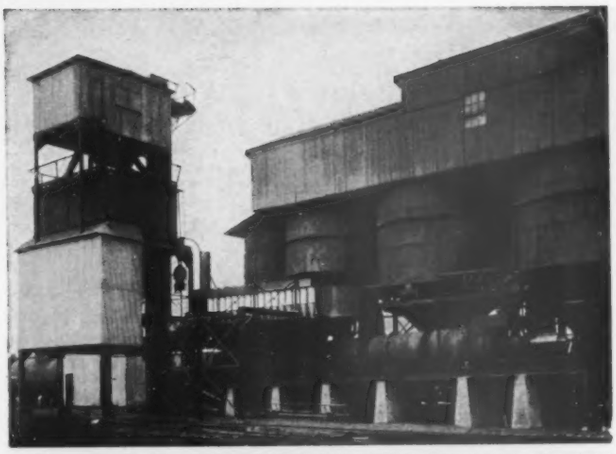
10. LARGER RADIUS OF SPOUT DISTRIBUTION—Use the spout for pouring directly into forms instead of using carts or wheelbarrows.

11. BETTER AND FASTER MIXING — Scientifically designed T-shaped spiral blades provide a fast end-to-end movement of the aggregates.

Write for New Catalog.

THE T. L. SMITH COMPANY
2887 N. 32nd STREET MILWAUKEE, WIS.

SMITH-MOBILE
THE *Modern* TRUCK MIXER and AGITATOR



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HOT MIX —— COLD MIX

—— OR ——

COMBINATION UNIT FOR BOTH TYPES

CAPACITY DESIGN AND ARRANGEMENT TO MEET ANY REQUIREMENTS

Designed and Built

—— By ——

WARREN BROTHERS ROADS CO.

P. O. BOX 1869

Boston Massachusetts

NOW you can get service, deliveries and prices on conveyors, screens and other handling equipment. You don't know what will happen in 1940. Telephone or write to the nearest Robins office today.

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15 PARK ROW NEW YORK, N. Y.

MATERIAL HANDLING ROBINS EQUIPMENT

OFFICES IN PRINCIPAL CITIES

STA-TRU

Long-Mesh Woven Wire Screens

made to work under tension and vibration.

The straight stay - bars carry ALL the tension. The crimps in the round wires can not be stretched or broken. The screen can not be caused to sag or split by the pull of the tensioning device.

LUDLOW-SAYLOR WIRE CO. ST. LOUIS

"CRACK DOWN" ON CRUSHING COSTS!

Give an AMERICAN the Job

AMERICAN Hammermills and Ringmills will reduce your toughest rocks and your crushing costs in the same operation. These powerfully built units effect economies in power and maintenance that insure extra profits in production.

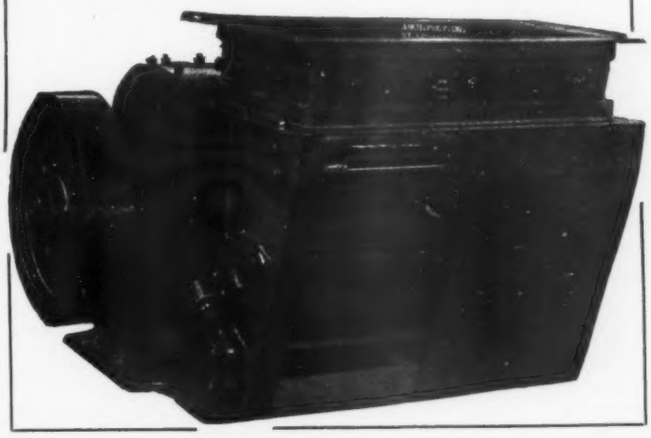
Material is crushed to a uniform size, free of chips and slivers.

AMERICAN Crushers are made in capacities from 10 to 100 tons per hour.

Write for complete details

AMERICAN PULVERIZER COMPANY

1245 Macklind Ave. St. Louis, Mo.



BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified.

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*Kent Machine Co.
Mortarless Tile Machine Co.
*Multiplex Concrete Machinery Co.
*Stearns Mfg. Co.

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*McLanahan and Stone Corp.
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*Jaeger Machine Co.
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Manganese Steel Forge Co.

Chain Drives
*Link-Belt Co.

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*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
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*McLanahan and Stone Corp.
Sprout, Waldron & Co.

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*Jeffrey Mfg. Co.
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*Deister Concentrator Co.
Deister Machine Co.

Concentrators (Slurry)
*Deister Concentrator Co.

*See also detail information in the 1939 Pit and Quarry HANDBOOK.

A few facts about shovels PROVE
BIGGER VALUE at LOWER COST
when you buy a BAY CITY

a few FACTS
about 3/4 yard
Shovels - Cranes - Draglines

	BAY CITY Model 42	BAY CITY Model 45	Average* ¾ Yard
Weight	42,000	44,400	36,915
Boom Length	18'0"	19'0"	17'9"
Dipper Sticks	13'0"	14'3"	13'11"
SHOVEL			
Dump Height	15'2"	16'10"	14'10"
Dump Radius	23'3"	24'2"	22'3"
Dig Radius	26'6"	27'11"	25'11"
CRANE SAFE LOADS			
12' Radius	17,000	20,000	15,715
20' Radius	8,350	9,700	7,770
30' Radius	4,700	5,700	4,490
Crawler Length	12'0"	12'6"	10'11"
Piston Displace.	517	520	443

*Based on available data from 10 other mfrs. of ¾ yd. jobs.

By every dipper-full and every count the BAY CITY offers you the biggest value.

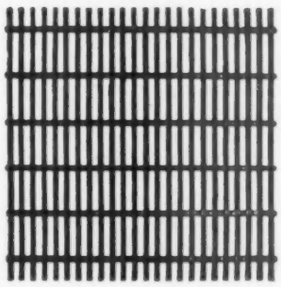
By every count the BAY CITY offers you biggest shovel, crane, dragline or trench hoe value—a glance at the chart proves this beyond doubt with better weights, wider working ranges and safer crane loads plus greater power. But this is only part of the story! All BAY CITY Shovels are fully convertible *without machinery change* • have powerful one piece chain crowd with electric dipper trip • are standard equipped with "E-Z" control power operated clutches • use unit-cast alloy steel bases. Here is big value at low cost.

That, too, is only part of the story for you should not be confused with low purchase price. The real cost is measured by combining purchase price with maintenance and operating costs. BAY CITY outstanding performance will pay big dividends in your excavating and material handling. For complete information write for Catalog H-3 containing 32 pages of shovel data and illustrations.

BAY CITY SHOVELS, Inc., Bay City, Michigan

BAY CITY Shovels, fully convertible are made in 12 sizes, ⅜ to 1¼ yard and with crane rating up to 20 tons. Also Truck Shovels and Cranes up to ¾ yard.

BAY CITY SHOVELS



Rolled Slot

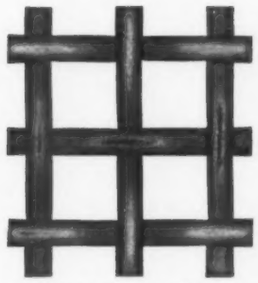
ALLOY No. 2

A super wearing Steel developed to resist the abrasion and vibration of modern screening demands.

"CLEVELAND" SCREENS

A wire cloth of guaranteed accuracy backed by fine workmanship and an effort to satisfy.

Available in Square Mesh and Rolled Slot. A trial will convince you of the superiority.



2 Mesh .162 Ga.

THE CLEVELAND WIRE CLOTH & MFG. COMPANY
574 E. 78th St. CLEVELAND, OHIO

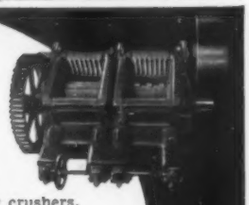
COMPLETE CONVEYOR SYSTEMS ENGINEERED TO YOUR NEEDS

Sprout-Waldron engineers will want to know the nature of material to be moved, the distance involved, the capacity required. Their job is to give you most efficient performance at lowest cost. Talk to a Sprout-Waldron sales engineer. There's no obligation, and he may be able to save you money. *Literature on request.*

SPROUT, WALDRON & CO. INC.
137 SHERMAN ST. MUNCY, PA.

ELEVATORS, CONVEYORS, POWER TRANSMISSION EQUIPMENT

McLANAHAN EQUIPMENT

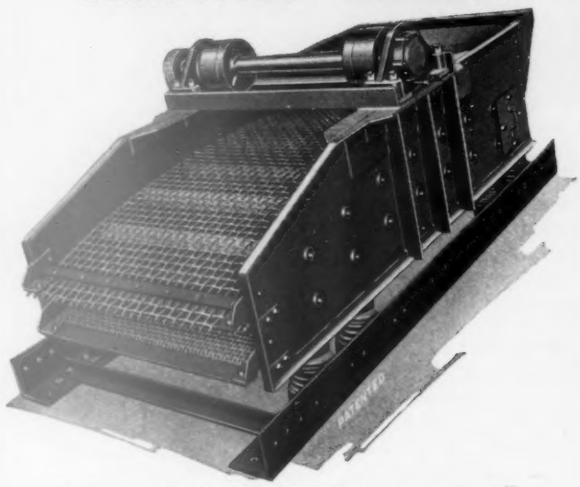


for ROCK—
SAND—GRAVEL

Single and double roll and jaw crushers, hammer mills, super dry pans, steel log washers and scrubbers, sand drags, revolving and vibrating screens, elevators, conveyors, dryers, jigs, hoists. Complete portable, semi-portable and stationary crushing, screening and washing plants for different capacities of any materials.

McLanahan & Stone Corporation
Established 1835
Hollidaysburg, Pennsylvania

DEISTER PLAT-O VIBRATING SCREEN



1. Powerful high-speed vibrating mechanism.
2. Screen cloth automatically held under uniform tension.
3. Any one screening surface changed without disturbing remaining decks.
4. Cushioned vibration.

DEISTER MACHINE CO.

1933 E. WAYNE ST. FT. WAYNE, IND.

MODEL LF-2

ONE OF THE NEW

DEMPSTER DUMPSTER MODELS

Carrying either the detachable, Drop-Bottom, Tilt-Type or Skip Buckets—with center of gravity well ahead of the rear axle. The LF-2 is built in sizes for handling the heaviest materials up to and including 4 cubic yards and for lighter materials up to and including 6 cubic yards.

Hand loading costs are reduced 40% to 60%.

Write or wire for complete details.

DEMPSTER BROS., INC.

KNOXVILLE, TENN. *(There's a Dealer near you.)*

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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*Gruendler Crusher & Pulv. Co.
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New Holland Machine Co.
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Smith Engr. Works
Sprout, Waldron & Co.
*Universal Crusher Co.

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*Fuller Company

Conveyors (Ready-Mixed Concrete)
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*Williams Patent Crusher & Pulverizer Co.

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Rogers Iron Works.
*Universal Crusher Co.
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New Holland Machine Co.
*Williams Patent Crusher & Pulverizer Co.

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DuPont De Nemours & Co., E. I.

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*Link-Belt Co.
Page Engineering Co.
*Sauerman Bros., Inc.

* See also detail information in the 1939 Pit and Quarry HANDBOOK.

Dragline Excavators
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
Harnischfeger Corp.
Jackson & Church Co.
*Koehring Co.
*Link-Belt Co.
Page Engineering Co.

Draglines (Walking)
*Bucyrus-Monighan Co.

Dredges
*Bucyrus-Erie Co.
Hetherington & Berner, Inc.
*Morris Machine Works

Driers
Jackson & Church Co.
Lewistown Fdry. & Machine
*Link-Belt Co.
*McLanahan and Stone Corp.
*Traylor Eng. & Mfg. Corp.
Tyler Co., W. S.

Drill Bit Reconditioning
*Bucyrus-Erie Co.

Drill Bits
*Bucyrus-Erie Co.

Drill Sharpening Machinery
*Bucyrus-Erie Co.

Drilling Accessories
*Bucyrus-Erie Co.

Drilling Contractors
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Blast-Hole)
*Bucyrus-Erie Co.

Drills (Core)
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Diamond)
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Rock)
*Jeffrey Mfg. Co.

Drills (Wagon)
*Bucyrus-Erie Co.

Drills (Well) (See Drills—Blast-Hole)

Drives (Multiple Belt, Chain, Rope)
*Link-Belt Co.

Dust Arresters
*Blaw-Knox Co.

Dust Collecting Systems
*Blaw-Knox Co.
*Raymond Pulverizer Division of the Combustion Engineering Co.

Dust Conveying Systems
*Blaw-Knox Co.
*Fuller Company

Dynamite (See Explosives)

Dynamos
*General Electric Co.

Electric Cables (See Cables—Electric)

Electrical Equipment
*General Electric Co.

Electrodes (Welding)
Stulz-Sickles Co.
Wall-Colmonoy Corp.

Elevator Belting (See Belting)

Elevator Buckets (See Buckets—Elevator and Conveyor)

Elevators (See Conveyors and Elevators)

Engineers
Bacon, Inc., Earle C.
*Fuller Company
Hetherington & Berner, Inc.
*McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Smidth & Co., F. L.
Sprout, Waldron & Co.
*Traylor Engr. & Mfg. Co.

Engine Generator Sets
See Generator Sets (Engine).

Engines (Diesel)
*Nordberg Mfg. Co.
Page Engineering Co.

Engines (Internal-Combustion)
*Nordberg Mfg. Co.
Page Engineering Co.

Engines (Steam)
*Morris Machine Works
*Nordberg Mfg. Co.

Excavating Machinery (See Shovels; Cranes; Buckets, etc.)

Excavators—Shallow Grading (Bucket Elevator Type)
*Haiss Mfg. Co., Geo.

Explosives
DuPont De Nemours & Co., E. I.

Fabricating (Electric Arc and Oxy Acetylene)
Stulz-Sickles Co.

Fans (Exhaust)
*General Electric Co.
*Jeffrey Mfg. Co.

Feeders
*Fuller Company
*Jeffrey Mfg. Co.
*Link-Belt Co.
*McLanahan and Stone Corp.
*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.
*Traylor Engr. & Mfg. Co.
*Universal Crusher Co.

Furnaces (Heat Treating, Electric)
*General Electric Co.

Fuses (Detonating)
DuPont De Nemours & Co., E. I.
*Ensign-Bickford Co.

Fuses (Electrical)
*General Electric Co.

Gaskets
*Cincinnati Rubber Mfg. Co.
Goodyear Tire & Rubber Co.

Gasoline Engines (See Engines—Internal-Combustion)

Gates (Bin) (See Bin Gates)

Gates (Clamshell)
*Haiss Mfg. Co., Geo.
*Link-Belt Co.

Gear Motors
*General Electric Co.

Gears (Herringbone)
*General Electric Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

Gears and Pinions
*General Electric Co.
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.

Gelatin (See Explosives)

Generator Sets (Engine)
*General Electric Co.

Generator Sets (Motor)
*General Electric Co.

Generator Sets (Turbine)
*General Electric Co.

Generators (See Motors and Generators)

Glass Sand Equipment
Lewistown Foundry & Machine Co.

Grab Buckets (See Buckets—Clamshell, Orange - Peel, etc.)

Grapples
Owen Bucket Co.

* See also detail information in the 1939 Pit and Quarry HANDBOOK.

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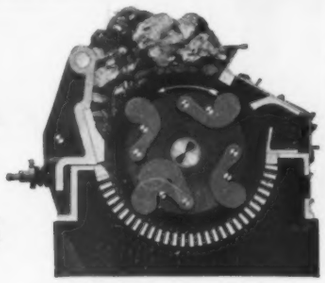
ENLARGE PROFITS



The Jeffrey "Flextooth" crusher is of the single roll type and is built in 10 sizes. It has a wide application in processing limestone, shale, marl, lime, cores, gypsum, etc. Renewable steel crusher teeth on the Flextooth crusher are so designed that they maintain their outward position by centrifugal force at a very slow speed. Large screen bar area assures large capacities of uniform product with minimum horsepower. You can reduce costs as well as material with Jeffrey reduction units. Let us tell you more about them.

REDUCTION DIVISION

THE JEFFREY MANUFACTURING CO.
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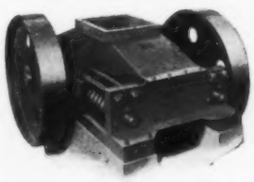

Jeffrey 'Flextooth' crusher (patented) is shown above. At the left is a Jeffrey double roll crusher with individual drive.

600-ft. span, 1½ cu. yd. Sauerman operates at same location many years, handling about 2,000,000 cu. yd. of material.

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Whether your problem is to dig gravel or to convey rock from quarry to crusher, or to stockpile and reclaim your surplus products—there is a size and type of Sauerman Cableway or Sauerman Scraper to meet your needs most economically. Put your problem up to us and we will save you money. *Write for Catalog.*

Small Sauerman Scraper supplies 25 tons of material per hour to crushing plant at hourly cost of less than $1.

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434 S. Clinton St. Chicago

SAUERMAN LONG RANGE MACHINES

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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*Hendrick Mfg. Co.

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*Link-Belt Co.
*Traylor Engr. & Mfg. Co.

Grizzlies
*Eagle Iron Works
*Hendrick Mfg. Co.
Lewistown Fdry. & Mach. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
*Robins Conveying Belt Co.
Smith Engr. Works

Guards (Wire)
Manganese Steel Forge Co.
*National Wire Cloth Co.

Guns (Hydraulic)
Hetherington & Berner, Inc.
Taylor Forge & Pipe Works

Hammer Mills (See Crushers—Hammer)

Hard Facing Metals
Wall-Colmonoy Corp.

Haulage Systems (Electric)
*General Electric Co.

Hoists
Commercial Shearing & Stamping Co.
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Hetherington & Berner, Inc.
Jackson & Church Co.
*Jaeger Machine Co.
*Jeffrey Mfg. Co.
*McLanahan and Stone Corp.
*Sauerman Bros., Inc.
Smith Engr. Works
Sprout, Waldron & Co.

Hoppers
*Hendrick Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.

Hose (Air, Steam and Water)
*Cincinnati Rubber Mfg. Co.
Gates Rubber Co.
Goodyear Tire & Rubber Co.

Hose (Petroleum)
Gates Rubber Co.

Hose (Radiator-Engine Cooling)
Gates Rubber Co.
Goodyear Tire & Rubber Co.

Hose Couplings (See Couplings)

Hydraulic Guns (See Guns—Hydraulic)

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*Barber-Greene Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
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Sprout, Waldron & Co.

Indicators (Material Level)
*Fuller Company

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*General Electric Co.

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*General Electric Co.

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*Link-Belt Co.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

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*Smidth & Co., F. L.

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*Eagle Iron Works

Ladders (Hydraulic Dredge)
*Eagle Iron Works

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*General Electric Co.

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*Fuller Company
Jackson & Church Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Raymond Pulverizer Division of the Combustion Engineering Co.
*Robins Conveying Belt Co.
*Traylor Engr. & Mfg. Co.

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Loaders and Unloaders
*Barber-Greene Co.
*Bucyrus-Erie Co.
*Fuller Company
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Locomotives (Diesel)
Plymouth Loco. Works Div. of the Fate-Root-Heath Co.

Locomotives (Diesel-Electric)
*General Electric Co.
Plymouth Loco. Works Div. of the Fate-Root-Heath Co.

Locomotives (Elec., Gas, Steam)
*General Electric Co.

Locomotives (Gas-Electric)
*General Electric Co.
Plymouth Loco. Works Div. of the Fate-Root-Heath Co.

Locomotives (Oil-Electric)
*General Electric Co.
Plymouth Loco. Works Div. of the Fate-Root-Heath Co.

Locomotives (Storage Battery)
*General Electric Co.

Locomotives (Trolley Battery)
*General Electric Co.
*Jeffrey Mfg. Co.

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*General Electric Co.

Manganese Steel
Manganese Steel Forge Co.

Manganese Steel (Plates and Sheets)
Manganese Steel Forge Co.

Measuring Devices (Electric)
*General Electric Co.

Mechanical Rubber Goods
*Cincinnati Rubber Mfg. Co.
Gates Rubber Co.
Goodyear Tire & Rubber Co.

Meters
*General Electric Co.

Mill Liners and Linings
*Jeffrey Mfg. Co.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Mills (Ball, Tube, etc.)
*Traylor Engr. & Mfg. Co.

Mills (Grinding) (See also Crushers—Hammer)
*American Pulverizer Co.
Jackson & Church Co.
*Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
*Raymond Pulverizer Division of the Combustion Engineering Co.
Rogers Iron Works
*Smidth & Co., F. L.
Sprout, Waldron & Co.
*Traylor Engr. & Mfg. Co.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Mixers (Asphalt)
Hetherington & Berner, Inc.
*Link-Belt Co.
*Warren Bros. Roads Co.

Mixers (Concrete)
Anchor Concrete Machy. Co.
*Kent Machine Co.
*Koehring Co.
*Link-Belt Co.
*Multiplex Concrete Machinery Co.
*Stearns Mfg. Co.

Motor Control
*General Electric Co.

Motor Trucks
Ford Motor Co.

Motors and Generators
*General Electric Co.
Harnischfeger Corp.

Motors (Electric)
*General Electric Co.

Motors (Internal-Combustion) (See Engines — Internal-Combustion)

Moulds and Forms (Concrete)
Anchor Concrete Machy. Co.
Dunn Mfg. Co., W. E.
*Kent Machine Co.
Mortarless Tile Machine Co.
*Multiplex Concrete Machinery Co.
*R & L Concrete Machy. Co.
*Stearns Mfg. Co.

Nails
*American Steel & Wire Co.

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*Deister Concentrator Co.

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Nozzles (Spray)
*Deister Concentrator Co.
*Link-Belt Co.

Outdoor Lighting Equipment
*General Electric Co.

Packings
*Cincinnati Rubber Mfg. Co.
Goodyear Tire & Rubber Co.

Pallets
Anchor Concrete Machy. Co.
Commercial Shearing & Stamping Co.
*Multiplex Concrete Machinery Co.
*Stearns Mfg. Co.

Pans (Wet and Dry)
Jackson & Church Co.

Partitions (Wire)
*National Wire Cloth Co.

Paving Mixers
*Jaeger Machine Co.
*Koehring Co.

Perforated Metal Plates
Chicago Perforating Co.
*Hendrick Mfg. Co.
Rogers Iron Works
*Sprout, Waldron & Co.

Pipe, Dredge (Floating and Shore)
Naylor Pipe Co.
Taylor Forge & Pipe Works

Pipe Flanges
Hetherington & Berner, Inc.
Naylor Pipe Co.
Taylor Forge & Pipe Works

Pipe Fittings
Hetherington & Berner, Inc.

Pipe Forms (Concrete)
*R & L Concrete Machy. Co.

Pipe Machines (Concrete)
*R & L Concrete Machy. Co.

Pipe (Spiral)
Naylor Pipe Co.
Taylor Forge & Pipe Co.

Pipe (Water, Gas, Low Pressure Steam)
Hetherington & Berner, Inc.

Pipe (Welded)
Naylor Pipe Co.
Taylor Forge & Pipe Co.

Plug Valves (See Valves)

Pneumatic Conveying Systems (See Conveyors—Pneumatic)

Pneumatic Drills (See Drills, Rock)

Portable Conveyors
*Barber-Greene Co.
*Fuller Company
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Portable Crushing and Screening Plants
*Barber-Greene Co.
*Gruendler Crusher & Pulv. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*McLanahan and Stone Corp.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Portable Engines (See Engines—Internal Combustion)

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Portable Washing Plants
*Universal Crusher Co.

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Power Cables (Rubber Clad)
*American Steel & Wire Co.

Power Shovels (See Shovels, Electric, Internal-Combustion and Steam)

Power Tampers (Concrete)
Anchor Concrete Machy. Co.
*Kent Machine Co.
Mortarless Tile Machine Co.
*Multiplex Concrete Machinery Co.
*Stearns Mfg. Co.

Power Units (Internal Combustion)
*Nordberg Mfg. Co.

*See also detail information in the 1939 Pit and Quarry HANDBOOK.

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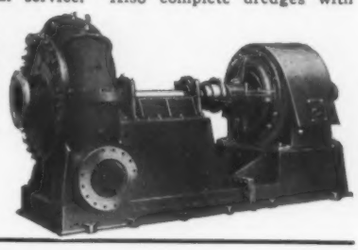

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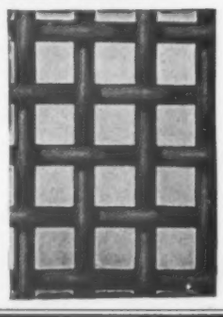

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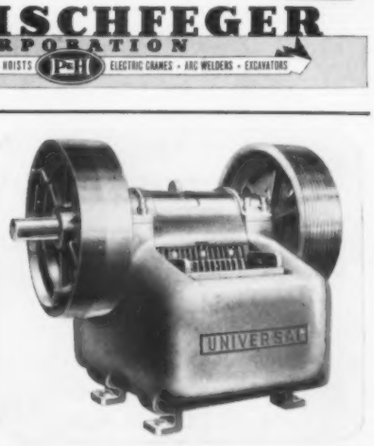

UNIVERSAL

BUYERS' GUIDE

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Pre-formed Wire Rope
*American Cable Division of the American Chain and Cable Co., Inc.

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*Multiplex Concrete Machinery Co.
*Stearns Mfg. Co.

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Jackson & Church Co.

Proportioning Equipment
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Jackson & Church Co.
*Jaeger Machine Co.

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Sprout, Waldron & Co.

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*Williams Patent Crusher & Pulverizer Co.

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*Fuller Company

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*Smidth & Co., F. L.

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*Morris Machine Works

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*Morris Machine Works

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*Morris Machine Works

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*Morris Machine Works

Pumps (Vacuum)
*Fuller Company

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*Morris Machine Works

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*Morris Machine Works

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Anchor Concrete Machy. Co.
*Kent Machine Co.
*Multiplex Concrete Machinery Co.
*Stearns Mfg. Co.

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*General Electric Co.

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*Jaeger Machine Co.

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*General Electric Co.

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*General Electric Co.

Rheostats
*General Electric Co.

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Rod Mills
Jackson & Church Co.
*Traylor Engr. & Mfg. Co.

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Gilmore Wire Rope Division of the Jones & Laughlin Steel Corp.
Stulz-Sickles Co.
Wall-Colmonoy Corp.

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*McLanahan and Stone Corp.

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*McLanahan and Stone Corp.
Smith Engr. Works

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*Link-Belt Co.
*Nordberg Mfg. Co.
Smith Engr. Works

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*Link-Belt Co.
*Sauerman Bros., Inc.

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Bacon, Inc., Earle C.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
*Deister Concentrator Co.
*Deister Machine Co.
*Eagle Iron Works
*Gruendler Crusher & Pulv. Co.
*Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
Ludlow-Saylor Wire Co.
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*McLanahan and Stone Corp.
*National Wire Cloth Co.
*Nordberg Mfg. Co.
*Robins Conveying Belt Co.
*Roebling's Sons Co., John A.
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Sprout, Waldron & Co.
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.
*Universal Crusher Co.

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*Barber-Greene Co.
*Deister Concentrator Co.
*Deister Machine Co.
*Gruendler Crusher & Pulv. Co.
*Jeffrey Mfg. Co.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
*McLanahan and Stone Corp.
New Holland Machine Co.
*Nordberg Mfg. Co.
*Robins Conveying Belt Co.
Rogers Iron Works
Screen Equipment Co.
Smith Engr. Works
Sprout, Waldron & Co.
*Tyler Co., W. S.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

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*Link-Belt Co.
*McLanahan and Stone Corp.
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.

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Separators (Slurry)
*Smidth & Co., F. L.

Sheaves
*Eagle Iron Works
Gates Rubber Co.
*Gruendler Crusher & Pulv. Co.
*Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*McLanahan and Stone Corp.
Sprout, Waldron & Co.

Shovels (Electric, Internal-Combustion and Steam)
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
Harnischfeger Corp.
*Koehring Co.
*Link-Belt Co.

Silos
Marietta Concrete Corp.
*Smidth & Co., F. L.

Skip Hoists and Skips
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Sleeves (Dredge)
*Cincinnati Rubber Mfg. Co.

Speed Reduction Units
*General Electric Co.
*Link-Belt Co.

Spouts (See Chutes and Chute Liners)

Sprays
*Deister Concentrator Co.

Sprockets and Chain
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

Stackers
*Jeffrey Mfg. Co.

Starters (Automatic Motor)
*General Electric Co.

Steel (Alloy)
(See Alloys—Steel)

Steel (High Tensile)
Gilmore Wire Rope Division of the Jones & Laughlin Steel Corp.
Manganese Steel Forge Co.

Steel (Open Hearth)
Gilmore Wire Rope Division of the Jones & Laughlin Steel Corp.
Manganese Steel Forge Co.

Steel Plate Construction
Gilmore Wire Rope Division of the Jones & Laughlin Steel Corp.
Hetherington & Berner, Inc.
Manganese Steel Forge Co.
Sprout, Waldron & Co.

Stone Grapples
Owen Bucket Co.

Storage Equipment
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Marietta Concrete Corp.
*Sauerman Bros., Inc.

Switchboards (Electric)
*General Electric Co.

Switches (Electric)
*General Electric Co.

Switches (Safety)
*General Electric Co.

Tamp Machines (Hand, Concrete)
Anchor Concrete Machy. Co.
*Kent Machine Co.
Mortarless Tile Machine Co.
*Multiplex Concrete Machinery Co.
*Stearns Mfg. Co.

Tanks
*Hendrick Mfg. Co.
Jackson & Church Co.
*Link-Belt Co.
*Traylor Engr. & Mfg. Co.

Tanks (Sand-Settling)
*Jeffrey Mfg. Co.
*Link-Belt Co.
Smith Engr. Works

Testing Sieves and Shakers
*Hendrick Mfg. Co.
*Tyler Co., W. S.

Thawing Equipment
Aeroil Burner Co.

Tires (Truck, Passenger Car or Tractor)
Goodyear Tire & Rubber Co.

Tire Repair Material
Goodyear Tire & Rubber Co.

Tools (Drill) (See Drilling Accessories)

Torches (Thawing)
Aeroil Burner Co.

Track Shifters
*Nordberg Mfg. Co.

Trailers
Ford Motor Co.

Trailers (Dump)
*Link-Belt Co.
Sprout, Waldron & Co.

Trailers (Industrial)
Ford Motor Co.

Trailers for Excavators
Link-Belt Co.

Tramways (Aerial Wire Rope)
*American Steel & Wire Co.
Bethlehem Steel Co.
*Roebling's Sons Co., John A.

Transformers
*General Electric Co.

Transmission Belting (See Belting)

Transmission Machinery
*Gruendler Crusher & Pulv. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Trench Hoes (Pull Shovels)
*Link Belt Co.

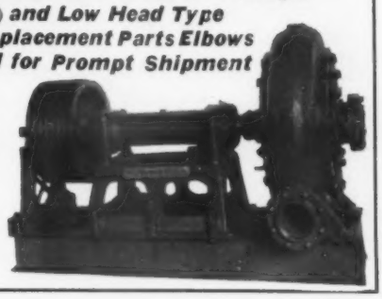
*See also detail information in the 1939 Pit and Quarry HANDBOOK.

ROTARY KILNS
GRINDING MACHINERY
for cement, lime, ores, etc.

F. L. SMIDTH & CO.
225 Broadway New York, N. Y.

LIGHTNING
Sand and Gravel Pumps
Heavy-Duty (Ball-Bearing) and Low Head Type
Complete stock of Replacement Parts Elbows and Fittings Carried for Prompt Shipment

High efficiency—low operating cost—precision workmanship—wear-resisting, non-heating bearings even when operated under extremely high heads. WRITE



KANSAS CITY HAY PRESS CO.
KANSAS CITY, MO.

ROL-MAN
TRUE MANGANESE STEEL
Screens
Highest abrasion resistance of any known steel. Double Lock Mesh Weave perpetuates initial accuracy for the life of the screen. Send for prices and performance facts.
MANGANESE STEEL FORGE CO., CASTOR AVE. & ALLEN ST., PHILA., PA.

Lewistown Foundry Products
ARE
Performance-Tested

BUCKET ELEVATORS
REVOLVING SCREENS
CRUSHERS DRY PANS

Lewistown Foundry & Machine Co.
Lewistown, Pa.

This is the machine that assures continuous pump dredge operation. The EAGLE "Swintek" Chain type Ladder saves power, time and labor losses due to pumping delays, and has increased capacity up to 400%.

Send for our descriptive literature—it will boost your credit balance on dredging jobs.

EAGLE
Points the Way to Profits

SAND and GRAVEL WASHERS

EAGLE Washers are a direct lead to better profits in the sand and gravel industry. Rigid highway and commercial specifications demand the most efficient equipment possible to supply aggregate of the required quality.

EAGLE Washers meet this need so well that many Highway Commissions and independent producers have recognized the superiority of these machines. The powerful scrubbing action insures cleaner sand and gravel. Units are designed and constructed to give a sharply increased production during a long service life.

Write for Bulletin

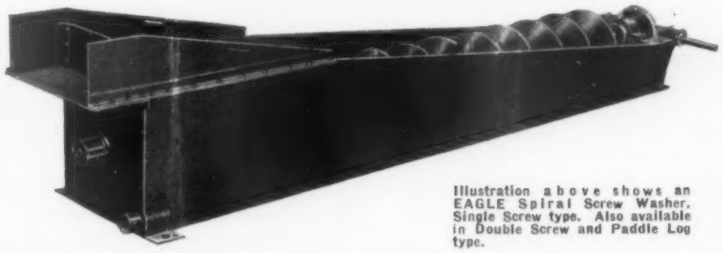


Illustration above shows an EAGLE Spiral Screw Washer, Single Screw type. Also available in Double Screw and Paddle Log type.

EAGLE IRON WORKS
DES MOINES, IOWA

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Index to Advertisers on Page 96

Trippers
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Truck Cranes (See Cranes)

Truck Mixers
*Blaw-Knox Co.
*Jaeger Machine Co.
*Smith Co., T. L.

Trucks and Trailers
(See Motor Trucks)

Tubes for Tire Casing
Goodyear Tire & Rubber Co.

Tube-Mills (See Mills—Ball, Tube, etc.)

Turbines
*General Electric Co.

Unit Heaters
*General Electric Co.

Unloaders (Box Car)
*Barber-Greene Co.
*Fuller Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Valves (Pump)
*Cincinnati Rubber Mfg. Co.
Taylor Forge & Pipe Works

Vibrating Screen Plate
Chicago Perforating Co.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.

Vibrating Screens (See Screens—Vibrating)

Vibrators
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Tyler Co., W. S.

Vibrators (Concrete)
Anchor Concrete Machinery Co.
Jackson & Church Co.
*Multiplex Concrete Machy. Co.
*Stearns Mfg. Co.

Wagons (Dump)
*Koehring Co.

Washers (Sand, Gravel and Stone)
*Eagle Iron Works
*Haiss Mfg. Co., Geo.
Lewistown Foundry & Mach. Co.
*Link-Belt Co.
*McLanahan and Stone Corp.
*Smidth & Co., F. L.
Smith Engr. Works
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.
*Universal Crusher Co.

Weighing Equipment (Automatic)
*Blaw-Knox Co.
*Fuller Co.
*Jaeger Machine Co.

Welding & Cutting Equipment.
*General Electric Co.
Stulz-Sickles Co.

Welding Bars, Wedge and Applicator (Nickel-Manganese Steel)
Stulz-Sickles Co.

Welding Rods
Stulz-Sickles Co.
Wall-Colmonoy Corp.

Welding Service
Stulz-Sickles Co.

Welding Supplies
*American Steel & Wire Co.
*General Electric Co.
Harnischfeger Corp.
Manganese Steel Forge Co.
*Roebling's Sons Co., John A.

Wheels (Car)
Jackson & Church Co.

Winches and Capstans
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Wire and Cable (Electric)
*American Steel & Wire Co.
*General Electric Co.

Wire Cloth
Cleveland Wire Cloth & Mfg. Co.
Ludlow-Saylor Wire Co.
Manganese Steel Forge Co.
*National Wire Cloth Co.
*Robins Conveying Belt Co.
*Roebling's Sons Co., John A.
*Tyler Co., W. S.

Wire Rope
*American Cable Division of the American Chain & Cable Co.
*American Steel & Wire Co.
Bethlehem Steel Co.
Gilmore Wire Rope Division of the Jones & Laughlin Steel Corp.
*Roebling's Sons Co., John A.

Wire Rope Fittings
*American Cable Division of the American Chain & Cable Co.
*American Steel & Wire Co.
Bethlehem Steel Co.
Gilmore Wire Rope Division of the Jones & Laughlin Steel Corp.
Page Engineering Co.
*Roebling's Sons Co., John A.

Wire Rope Slings
*American Cable Division of the American Chain & Cable Co.
*American Steel & Wire Co.
Bethlehem Steel Corp.
Gilmore Wire Rope Division of the Jones & Laughlin Steel Corp.
*Roebling's Sons Co., John A.

Wire (Welding)
*American Steel & Wire Co.
Gilmore Wire Rope Division of the Jones & Laughlin Steel Corp.
Manganese Steel Forge Co.
*Roebling's Sons Co., John A.

Worm Gears (See Gears and Pinions)

*See also detail information in the 1939 Pit and Quarry HANDBOOK.

BROADCAST SECTION

CONCRETE—CEMENT—EQUIPMENT
Butler batching plant, 3 compts., cap. 105 yds. aggregate, 200 bbl. cement, weighing devices, elevator, conveyors, complete.
225 bbl. Erie bulk cement plant, complete.
155 bbl. Fuller cement bin, electric batcher.
Blaw-Knox 270 bbls. bulk cement plant, complete.
Pumpcrete machines, Models 180, 190 & 200.
Fuller Kinyon bulk cement unloader, portable.
Fuller C40 rotary air compressor, electric.

CRUSHERS—PULVERIZERS—SCREENS—FEEDERS
Jaw: 6x12, 9x16, 10x20, 12x26, 13x30, 18x36, 24x36.
Gyratory: K.V.S., 19, 25-S, 30, 37-S, 49; Telsmith 8A; Traylor 8"; Superior McCully 13", 8", 6".
Jeffrey Type A 30"x24" pulverizer.
Jeffrey 24"x24" spiked roll crusher.
Robins apron feeders, 18"x6', 24"x6'.
Traylor apron feeder, 5'x15'.
Bucket elevator, 32' chain, buckets 8"x6"x12".
3'x6' K.V.S. single deck, vibrating.
3'x6' K.V.S. 3 decks, vibrating.
Revolving screens, 72"x20', 72"x18', 60"x24'.
Robins 4x8 double deck Gyrex vib. screen.

CRANES—SHOVELS—DRAGLINES
Whirley, 25 tons cap., 85' boom, electric.
43-B Bucyrus-Erie Diesel 2 yd. shovel.
41-B Bucyrus-Erie comb. crane and shovel, steam.
P & H Model 650 crane, 60' boom.
Northwest No. 4 crane and backhoe.
Browning truck crane on White chassis.
Byers Bearcat truck crane, pneumatic tires.

BUCKETS
Hayward clamshell, 1 yd., rehandling.
Haiss clamshell 1½ yd., rehandling.
Sauerman Crescent drag scraper, ¾ yd.
Blaw Knox 1 cu. yd. dragline bucket.

CONVEYING EQUIPMENT
Barber-Greene conveyor, 24"x200', complete.
8 Barber-Greene conveyors, 24"x35', type N.

MISCELLANEOUS
Gas locomotives, 2½ to 35 tons.
Dredge pumps, 6", 8", 10", 12", 16".
4 I.R. wagon drills, Model FM-2, pneumatic tires.
I.R. Model 50 Leyner drill sharpener.
Ing. Rand XCB-2 676 cu. ft. air compressor.
Sullivan WJ-3 850 cu. ft. air compressor.
Stiff leg derrick, steel, 30 tons, 97' boom.
Steam hoist, 10"x12", 3 drums, Lidgerwood.
Clyde 3 drum electric hoist and swinger, 75HP.
Complete stone washing plant. Write for details.

RICHARD P. WALSH, 30 Church St., New York, N. Y.

SPECIAL OFFERING
of Standard Gauge
Saddle Tank Locomotives
All Thoroughly Reconditioned

Four—14x22" American 40 Ton.
One—15x22" Porter 40 Ton.
One—14x20" Porter 36 Ton.
One—14x20" Vulcan 36 Ton.
One—13x18" Porter 32 Ton.
One—12x18" American 26 Ton.

Very Attractive Prices

Also have large stock all industrial types, steam and gasoline.

Complete Stock List on Request.

BIRMINGHAM RAIL & LOCOMOTIVE COMPANY
Birmingham Alabama

For Prompt Shipment Subject to Prior Sale

10 x 36 Gruendler Roller Bearing Crusher with RA2P LeRoi Engine.
28' Elevator.
36 x 12' Screen.
30 Ton, 4 compartment Bin.
26' Reject Conveyor (Slightly used, as good as new).
NEW 15 x 36 Gruendler Roller Bearing Jaw Crusher.
NEW 11 x 20 Bronze Bearing Jaw Crusher.
NEW 24 x 36 Plain Bearing Jaw Crusher.
NEW 30 x 18 Roller Bearing Double Roll Crusher.
1—USED 5 ton per hour Day Pulverizer.
1—USED 10 to 15 ton per hour Gruendler Pulverizer.
1—NEW 10 to 15 ton per hour Pulverizer.
1—NEW 6 to 7 ton per hour Gruendler Pulverizer.
1—36 x 16' Trunnion type Revolving Screen with Dust Jacket.

CRUSHER SERVICE
Box 975
St. Louis Missouri

Jaw, Roll & Cone Crushers, all sizes.
8A, 10B, 32B, 40B Telsmith, No. 19 & 47 Kennedy.
No. 3, 4, 6 TZ Traylor Gyratory Crushers.
Swintex Cutters, 25/8", 50/10", 45/15" pipe.
4 Gardner-Denver Derrick Drills, Model 21.
5, 8, 10, 12" Sand & Gravel Pumps, other Centrifugals.
Conveying Equipment 14" to 36". Belt & Portable.
Barber-Greene Loaders Models 42, 57 and 82.
Vibrating & Rotary Screens, all Types & Sizes.
2—18 ton, 2—21 ton Davenport 36" Ga. Locos.
Gasoline Locos, all Weights & Gauges. Dump Cars.
1½ yd. Page "C" Dragline Bucket. Ask for Bulletin 47.

MID-CONTINENT EQUIPMENT CO.
710 Eastgate Fa 2290 St. Louis, Mo.

RELAYING RAILS
All sections new and relaying rail, spikes, bolts frogs, switches, "Y" Shaped, flat and Contractors' Cars, etc. Prices cheerfully quoted

M. K. FRANK
480 Lexington Ave., NEW YORK CITY
25 St. Nicholas Bldg., PITTSBURGH, PENNA.

INGERSOLL-RAND COMPRESSORS FOR SALE
1—XCB-2, 676 cu. ft. excellent condition. Used only 6 months.
1—XRB-2, 676 cu. ft. excellent condition.
1—Type 10—steam driven, steam cylinder 14 inch. Air cylinders 22 and 13, stroke 16 inch. 1051 cu. ft.

WILLIS VENABLE, Barre, Vermont

Consolidated Offers:

JAW CRUSHERS

1—24x36″ Farrell, B-15—new jaws. Used one month after complete rebuilding.
2—8x36″ Universal, reduction type. Can be set to ¾″.
1—42x48″ Traylor Bull-dog.
1—18x30″ Allis-Chalmers.

GYRATORY FINE REDUCTION CRUSHERS

2—2′ Symons Cones, fine bowls.
2—No. 2F Telsmith, 32″ dia. heads—to ⅝″.
1—No. 37 Kennedy Gearless, with spare shaft.
1—4′ Traylor, Type No. 410-TZ.
1—3′ Traylor, Type TZ.
1—No. 25 Kennedy, vertical, motor driven.
1—8″ Traylor with bell head and non-choking concaves.
1—10″ Newhouse, with 100 H.P. motor.

CRUSHING ROLLS

7—Sets of 24″ dia. x 14″ Allis-Chalmers.
1—Set of 20″x14″ Sturtevant, balanced type.
1—Set of 36″x16″ Sturtevant.
1—Set of 26″x14″ Allis-Chalmers.

VIBRATING SCREENS

18—Tyler Hummers; 12—3′x5′, 4—4′x5′, all double deck; 3x5′ triple deck; 4x5′ triple deck. All of the steel enclosed type, with V-16 vibrators.
1—Tyler Rotap Testing Screen, motor driven.
5—Motor Generator Sets for operating Tyler Screens; 1 KW, 1½ KW., 2 KW, 6 KW.
2—3′x5′ Leahy single and double deck.
5—4′x7′ Leahy, double deck, motor driven.
4—3′x6′ Sturtevant M-V, double deck.
1—4′x8′ Symons, 3-deck.
3—5′x10′ Symons, 3-deck, motor driven.
2—4′x7′ Traylor, 2-deck.

BELT CONVEYORS

3—16″, 35′, 85′, 160′ c/c.
1—18″ 100′ c/c.
3—24″ 80′, 160′, 210′ c/c.

All of these conveyors are equipped with Rex-Stearns anti-friction ball bearing troughing and return idlers. The 80′ conveyor has a magnetic head pulley.

RAYMOND PULVERIZERS

3—No. 60 "Imp" type, each with air separator and direct connected 60 H.P., 3/60/440 volt, 1750 R.P.M. motor, also feeder motor.
2—3-roll and 5-roll, High Side type, for fine separation.
3—4-roll and 5-roll, Low Side type.
8—Beater types; No. 0000, 00, 0, 1 and 3.
2—No. 0000, with direct connected 10 H.P. motors.

HARDINGE CONICAL BALL MILLS

1—3′x8″ iron lined, worm gears, silent chain drive.
2—4½′x16″, iron and silex lined.
1—5′x22″, iron lined.
2—6′x22″, iron and silex lined.
1—7′x22″ Hardinge Conical Ball Mill, titanite lined, 28″ trunnions.
6—8′x72″, 12″ herringbone gears, 20″ trunnions, steel shells, steel heads, scoop feeders, railroad rail liners.
3—8′x18″, 8″ herr. gears, railroad rail liners.
5—8′x30″, steel shells, 10″ herr. gears, arranged for direct motor drive through flexible coupling; iron lined.
2—8′x30″, same as above, but silex lined.
1—6′x30″, silex lined, 8″ herr. gears, 13″ trunnions.

INDIRECT HEAT ROTARY DRYERS

3—4′x35′, 70″x40′, 80″x65′, all type BV, made by L. R. Christie Co., Pittsburgh.

Refer to full page ad November issue for listings of several plants we are now liquidating, or write for detailed circular.

Write for detailed illustrated circulars

CONSOLIDATED PRODUCTS CO., INC.

17-19 PARK ROW — NEW YORK, N. Y.

Our shops at Newark, N. J., cover eight acres

GRAVEL PLANT EQUIPMENT

By Owner

Bucyrus 50-B Elec. Shovel—440 V.—60 cyc.—1¾ Yd. **No. 4651**
20 Ton Amer. Hoist & Derrick Crane, steam 1½ Yd. . . **No. 1115**
7″ Newhouse Crusher . . . . . **No. 8286**
Scalper Screen—72″ x 12′—Galland Henning.
Washing Screen—60″ x 12′—Galland Henning.
6″ Fairbanks Morse pump—direct conn. 50 HP motor.
10″—CI pipe—70 lb. rail—24″ belt.
Head and tail pulley assemblies—rollers and idlers.

150 HP Motor	GE	220 V. 3 ph.	600 RPM
50 HP Motor	WEST	220 V. 3 ph.	1120 RPM
50 HP Motor	GE	220 V. 3 ph.	900 RPM
50 HP Motor	GE	220 V. 3 ph.	900 RPM
30 HP Motor	GE	220 V. 3 ph.	1800 RPM
30 HP Motor	GE	220 V. 3 ph.	720 RPM
25 HP Motor	GE	220 V. 3 ph.	720 RPM
15 HP Motor	GE	220 V. 3 ph.	1200 RPM
15 HP Motor	WEST	220 V. 3 ph.	860 RPM
5 HP Motor	GE	220 V. 3 ph.	1200 RPM
5 HP Motor	Allis-Chal.	220 V. 3 ph.	1200 RPM

ALL SUBJECT TO PRIOR SALE

WISCONSIN SAND AND GRAVEL COMPANY

623 NORTH SECOND STREET — MILWAUKEE, WISCONSIN

EMERGENCY NEED?

Freight Cars; any kind
Locomotives; all types
Relaying Rails
Freight Car Repair Parts
Perhaps **we** can supply
your requirements, and **immediately?**

OTHER MACHINERY
and EQUIPMENT, TOO!

IRON & STEEL PRODUCTS, Inc.
13490 S. Brainard Ave., Chicago, Ill.

"Anything containing IRON or STEEL"

EQUIPMENT FOR SALE CHEAP

1—Vulcan 40 ton Std. Ga. Saddle tank locomotive.
1—Marion 1 yd. Steam crane 40′ boom on cats.
1—Russell Grader, 10′ Blade.
1—Link-Belt K-30 Trench Hoe, 45′ Boom.
1—Link-Belt K-44 shovel 50′ boom, fairleads.
1—Lorain 75 B 1¼ yd. chain crowd shovel.
2—Whitcomb 12 Ton 36″ Gauge Locomotives.
2—C. P. Compressors, 590 cu. ft., 100 h.p. motor.
2—Worthington Compressors, 621 cu. ft., 75 h.p. mtr.
1—Monarch 75 Caterpillar with bulldozer.
1—Sullivan 310′ portable compressor.
1—Ingersoll-Rand pavement breaker.
6—Easton 4 yd. all steel 36″ Ga. cars.
4000′ of 9″ x 9″ road forms.
1—Ransome 27 E Paver.
2—No. 116 Chicago Pneumatic Paving Breakers.
2—1 yd. Insley bottom dump concrete buckets.
1—Schramm No. 120 Compressor.
1—1 yd. Owen Bucket.
1—1 yd. Kiesler rehandling bucket.
1—¾ yd. Browning clamshell bucket.
1—¾ yd. Blaw-Knox bucket.
1—Le Courtney 6″ Cent. Pump, 40 h.p. motors.
1—Morris 8″ dredge pump, 150 h.p. G.E. motor.
1—Morris 10″ cent. pump, 2250 GPM at 130′ head.
1—Goulds 12″ cent. pump, 50 h.p. G.E. motor.
1—Thompson 6″ self-priming pump, Waukesha motor.
2—Gardner Denver Sheeting Hammers.
2—Humdinger 6″ self-priming pumps, gas motor.
1—Humdinger 4″ self-priming pump.
1—Humdinger 2″ self-priming pump.
1—Domestic double diaphragm pump, gas motor.
1—G.E. motor, 200 h.p. slipring.
2—No. 9 B 2 McKiernan-Terry Hammers.
3—No. 5 McKiernan-Terry Hammers.
3—No. 7 McKiernan-Terry Hammers.

HARRY C. LEWIS

125 Frelinghuysen Avenue — Newark, N. J.

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ENTIRE COMMERCIAL GRAVEL PLANT

Lorain 75 Electric 1¼ Yd. Shovel.
Bucyrus 50-B Electric 1¾ Yd. Shovel.
American Hoist & Derrick, 20 ton, Steam, M. C. B. Crane, 1½ Yd. Bucket.
Telsmith Primary Breaker, Size 13-A.
Symons 3 ft. Cone Crusher, No. 360.
14—Electric Motors, 7½ to 60 H.P.
650 ft. of Belt Conveyor, 24″, 26″ and 30″ wide, with Idlers, Pulleys, etc.
2—American Centrifugal Pumps—1,000 G.P.M. each, 8″ intake, 6″ discharge.
Sizing and Scalping Screens.
Miscellaneous small tools and equipment for a material plant.
Priced for quick sale—Special Bulletin sent upon request.

CUNNINGHAM-ORTMAYER-COMPANY
429 W. MICHIGAN ST., MILWAUKEE, WIS.
Phone—DAly 5955

CRUSHERS

GYRATORY: 42″ McCully with 80% brand new parts. 36″ Allis-C. 20″ Super. McCully conv. to 16″. Gates Nos. 10, 9, 8, 7½, 6, 5, 4, 3, 2, 1 (75 avail.) Telsmith Nos. 4, 5, 6, 8C, 9 & 16. Also many Austins, Kennedys and Traylors, many sizes.

JAW TYPE: Traylor 60x84, 48x60, 42x48, 24x72. Superior 84x66 & 24x36. Buchanan 30x42. Farrel 60x42, 30x36, 24x36, 18x36, 12x24. Good Roads 1030. Acme 24x40. Misc. 7x12, 9x16, 8x20, 8x24, 12x24, 9x36, 9x30, 15x36.

REDUC. TYPE: Kennedy Nos. 25, 37 & 49. Telsmith 3-F & 40. Traylor 36″ TZ, 8″, 10″, 12″. Super. McCully 6″ & 10″. Newhouse 5, 7 & 10″. Symons Cone & Disc. Ty. 2′ to 4′.

ROLLS: Allis-C. 12½x12, 36x16, 40x15, 54x24 & 72x30. Fairmount 36x60 & Jeffrey 24x24 to 36x54 single roll. Cornish 36x14 & 42x16, Etc., Etc.

HAMMERMILLS: Williams Nos. 1, 2, 3, 4, 8 & 9. Jeffrey 36x18 & 36x42. Day Nos. 20 & 40, Etc.

MILLS: Kennedy Ball 4x6, 5x6 & 5x8. March 8x6 & 10x9. Hardinge 6′x3′, 8′x30″ & 6′x9′. Misc. Tube Mills 5′ & 6′x22′. Sturtevant Ring Roll, Raymonds, Kents, Fuller-Lehigh, Etc., Etc.

CRUSHING PLANTS: No. 65 Diamond. No. 22 Pioneer 8x24. 1030 Good Roads, 9x40 Austin-Western, 9x36 C.R.

MISCELLANEOUS ITEMS

Barges, Bins, Buckets, Boilers, Cableways, Cars, Compressors, Conveyors, Cranes, Dryers, Derricks, Draglines, Drag Scrapers, Dredges, Drills, Engines, Elevators, Excavators, Generators, Hoists, Kilns, Locomotives, Loaders, Motors, Pipe, Pumps, Rail, Scales, Screens, Slacklines, Shovels, Tanks, Trucks, Tractors, Etc., in many sizes, types and makes at low prices.

(I have equipment at many points in the United States and Canada. What you need may be near your plant.)

ALEX T. McLEOD
7229 Rogers Avenue — CHICAGO

VIBR TING SCREEN FOR SALE

1—4 ft. x 10 ft. Telsmith Pulsator (Inclined Vibrating Screen). Used only 6 months.

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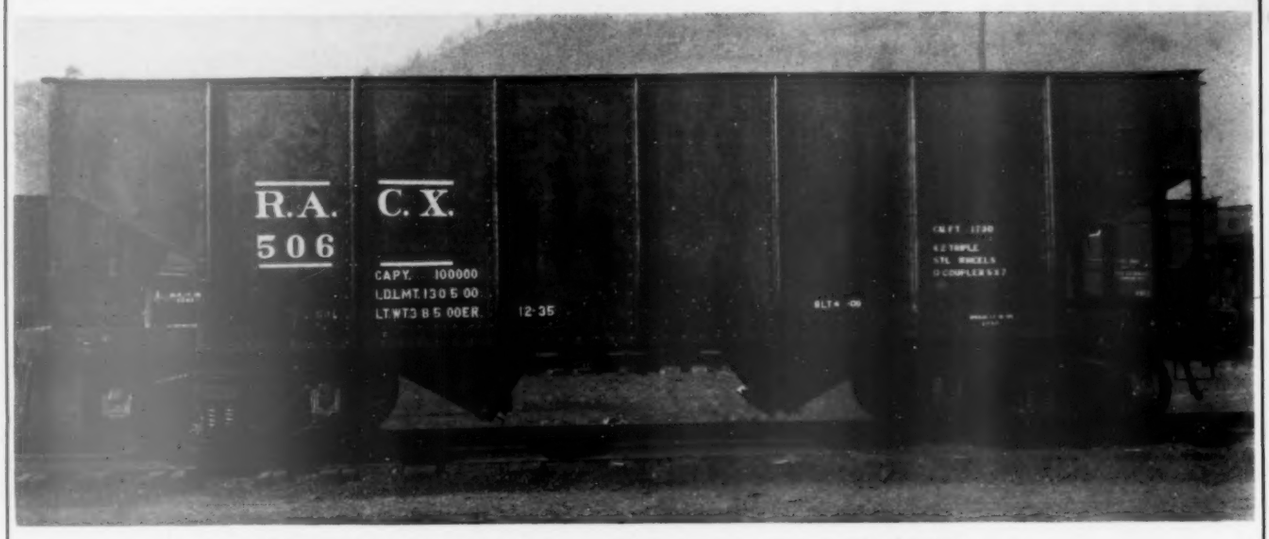

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100 KW G.E., 250 V., 2300 A.C., 1200 RPM

AIR COMPRESSORS

1302′ I-R, PRE-2, Dir. Con. 440 V. Syn. Mt. 100 #
1052′ I-R, XCB, Belted 2200 V. Syn. Mt. 100 #
1050′ I-R, PRE-2, Dir. Con. 2300 V. Syn. Mt. 100 #
676′ I-R, XRE, Dir. Con. 2300 V. Syn. Mt. 100 #

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Model 955 P&H Dragline, 85′ Boom 3 yard bucket, Fairbanks-Morse diesel engine.

Model 8 Northwest Dragline, 70′ Boom 2 yard Page Bucket, Twin City oil engine.

Model 6 Northwest, 1½ yard dipper, oil engine.

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1—No. 29 Armstrong Well Drill. Long Crawlers, Electric Power.

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Hazleton, Pa. Telephone 3906

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PORTABLE GAS: 110, 160, 220, 310, 540 & 1300 Ft.
STEAM: 49, 310, 528, 1300 & 2200 Ft.

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50 Skips and Battleship Type, 2 to 6 yds.
5 Owen & Bucyrus Rock Grabs.
CLAMSHELL: ½, ¾, 1, 1½ & 2 Yds.
ORANGE PEEL: ¾, 1, 1½, 2 & 3 Yds.
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12 Ton NORTHWEST 50 Ft. Boom Gas
12 Ton KOEHRING 45 Ft. Boom Gas
16 Ton Speedcrane, Gas, 50 ft. Boom
25 Ton BROWNING & 30 Ton AMERICAN Locomotive
25 Ton LINK BELT K-48 Electric, 70 Ft. Boom
2½ Yd. Lorain Model 95, Diesel Dragline

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½ Yd. P. & H. Gas & ⅜ Yd. Insley Gas
¾ Yd. KOEHRING Gasoline
¾, 1¼ Yd., 2 Yd., 4 Yd. & 8 Yd. MARION Electrics
1 Yd. NORTHWEST Gas & 7/8B2 Steamer
1½ Yd. BUCYRUS 41B Steamer

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20—Std. Ga. 12 Yd., 16 Yd., 20 Yd. & 30 Yd. Cap.

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4—Nos. 5, 5 & 6 Austin Gyratory
2—Traylor T-12 Bulldog Gyratory
8 in. Traylor T. Gyratory, Telsmith No. 9
17 Gates K—Nos. 3, 4, 5, 6, 7½, 8 & 9½
10 Inch Austin Model 105
10 & 13 Inch Superior McCullus
KENNEDY: Nos. 10, 25, 27, 30 & 49

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Pennsylvania Trojan M-1.
4 Jeffreys: 24x18-A, 36x24-B, 42x36-E & 42x48-B.
Williams No. 1 Jumbo Jr., & No. 6 Universal.
Gruendler No. 6 X.
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7—Ingersoll-Rand Wagon Drills

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400 BBl. Portable BUTLER Bulk Cement Bin with Fuller Full Automatic Electric Push Button Weigh Batcher

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60-100 H.P. GEN. ELEC. 3/60/220-440 v., 900-1200 rpm.

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Air: ¼ in. to 1½ in. Water: ¾ in. to 10 in.

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IDLERS: 36 In., 30 In., 24 In., 20 In., 18 In. Head & Tail-Pulleys—Takeup for all sizes
Steel Frames: 2,000 ft. 24 In., 30 In. & 36 In. Sections

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36 In. x 20 Ft., 3 Ft. x 30 Ft., 4 Ft. x 30 Ft., 54 In. x 30 Ft., 42 In. x 24 Ft., 5 Ft. x 30 Ft., 5 ft. x 18 Ft., 5 Ft. x 60 Ft., 6 Ft. x 60 Ft., 6 Ft. x 70 Ft., 70 In. x 40 Ft., 5x30 & 8x84 Double Shell Dryers, 8x110 & 7½x100 Kilns.

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GUY: 8 Ton 85 Ft. Boom, 15 Ton 100 Ft. Boom, 20 Ton 115 Ft. Boom, 50 Ton 100 Ft. Boom
STIFF LEG: 5 Ton 70 Ft. Boom, 15 Ton 100 Ft. Boom, 25 Ton 100 Ft. Boom, 75 Ton 135 Ft. Boom

LOCOMOTIVES
GASOLINE: 3 Ton, 5 Ton, 8 Ton, 12, 14 & 30 Ton
STEAM: 9 Ton, 20 Ton, 40 Ton, 60 Ton & 80 Ton.
ELECTRIC: 2 Ton, 5 Ton, 8 Ton, 17 Ton & 40 Ton

SCREENS
VIBRATING: 2x4, 3x6, 2x8, 3x8, 3x5, 4x5, 4x8, 4x10, 48x72, HUMMER, ROTEX, NIAGARA & ROBINS, LINK BELT & HURON
REVOLVING: 3x12, 3x16, 3½x18, 3x24, 4x16, 4x20, 4x23, 4x24, 5x30, 5x26, 6x20

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Suitable for the manufacture of sand-lime and high-pressure steam cured concrete brick and block.

NEW EQUIPMENT

2—**Double conical slaking and mixing drums.** Each drum is designed for 118 lbs. steam pressure, largest diameter 7½′, inside length 13′. Mixing capacity of each 560 cubic feet, operates on trunnions, driven by internal gear with tight and loose pulleys. Has lever brake, steel strap, feeding manhole, inlet pipe for water and steam, completely equipped with control three-way cocks, safety valves, air inlet cocks, etc.

1—**Wrought-iron tank** with float control.

2—**Power driven automatic feeders** which control flow of the material. Each is provided with rotary plate, conical wheels, tight and loose pulleys, etc.

2—**Pug Mills** designed to create a perfect mix of the material. Inside dimensions of each mill 24" wide and 8′ long. Both are completely equipped.

2—**Sixteen-mould Rotary Sand-Lime Brick Presses** of latest construction, particularly heavy type. Each press has a capacity of 2400 standard size brick per hour. Is driven by double toothed gearing and pulleys. Moulds are automatically charged. Supplied complete with latest safety devices including automatic safety clutch.

4—**Cast-iron special turn tables** moving on balls without any shocks designed for trucks of 29.5" gauge, provided with turn bull race.

Belting and other miscellaneous equipment included.

This equipment is absolutely new, has never been assembled and is still packed in the original shipping boxes, etc., is heavily constructed and guaranteed to be in perfect condition. Priced for quick sale at less than one third of actual cost. Pictures of machinery and complete details furnished upon request.

USED EQUIPMENT

3—**Hardening cylinders.** Diameter 6½′. Inside length 56′. Each has bolted head, swung from a jib crane. Are designed for 125 lbs. steam pressure, completely equipped with all necessary piping, valves, steam traps, tracks, etc.

75—**Brick Cars.** 37" wide x 68" long. Are heavily constructed. Have steel roller bearings, ¼" top plate, are heavily braced, weighing approximately 700 lbs.

1—**Rod Mill.** Diameter 4¼′ x 10′6" long. Completely equipped with driving mechanism, belting, has several tons of rods and a 50 horse-power electric motor. Both are in A-1 condition.

2—**Steel Hoppers.** Both are equipped with volumeters. Size of the smaller hopper, 14′ x 14′ at the top coming down vertically 3′, then tapering down to a throat. Capacity of this particular hopper is approximately 50 tons. Size of other hopper, 14′ x 18′, coming down vertically 3′, then tapering down to a throat. Each hopper is supported by steel H columns. Both of the hoppers are heavily cross braced. Capacity of the larger hopper is approximately 70 tons.

1—**Elevator,** wood casing, 2′ x 3′9". Has 16" belt, buckets, 13½", height 35′. Also has a 6′ belt conveyor off head.

1—**Sand elevator,** steel casing, 1′6" x 3′7½", has chain and buckets, 6½" x 4½", height 40′. Also has a 6′ belt conveyor off head.

1—**Lime Elevator,** at hydrator. Has steel casing, 1′2½" x 3′6", equipped with chain and buckets, 6½" x 4½", height 29′8".

1—**Mixed material elevator.** Has steel casing, size 1′2½" x 3′6", equipped with 9" belt and buckets 9" x 6½", height 30′6".

1—**Combination belt conveyor.** 150′ long, 23" belt, equipped with troughing and return idlers. Ball bearing, belt, etc.

1—**Screw Conveyor.** Approximately 275′ long. One section, 85′, another 20′, another 30′ in length. Has 9" steel trough, ratchet type gates, necessary driving mechanism.

The foregoing used equipment was only operated four years. It has always been housed inside of the building where it is located. The hardening cylinders are completely covered with an asbestos covering, which has preserved the steel from undue rust and corrosion. Have 500 track feet of 3", 20 lb. rail, one transfer car and other miscellaneous equipment. This equipment is priced at a fraction of its original cost. All equipment in excellent condition, as good as new. Full particulars furnished upon request. Inquiries are invited.

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1—No. 4 Northwest Pull Shovel and Crane ¾ Yd. Page and ¾ Yd. Bucket. New Condition. $7,000.

1—Link-Belt Gas Crawler Crane.

2—Haiss and Barber-Greene Loaders.

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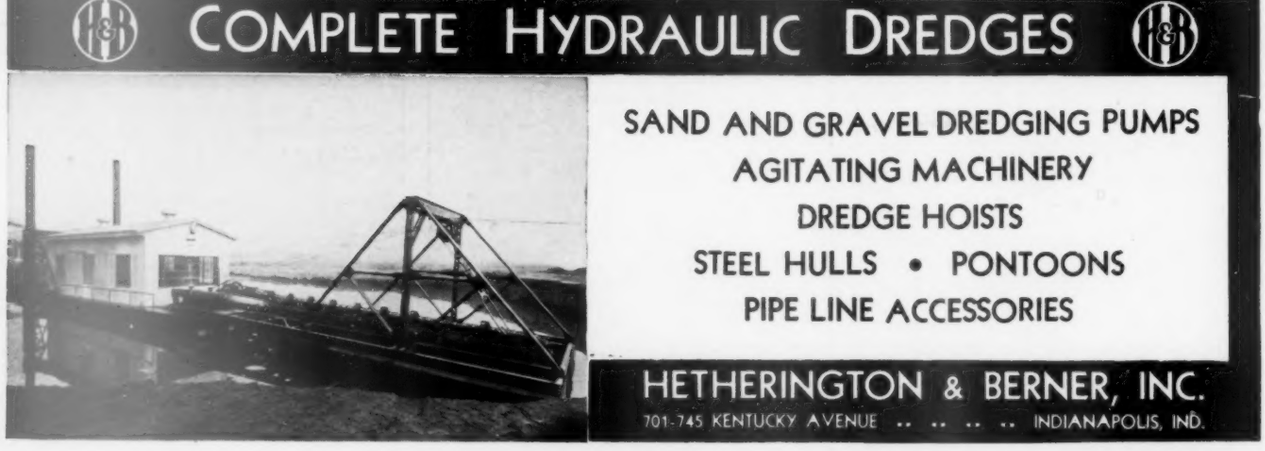
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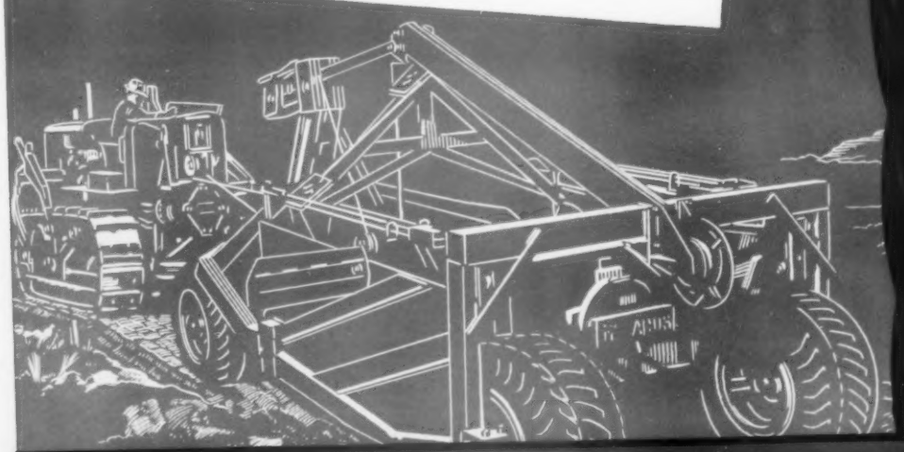

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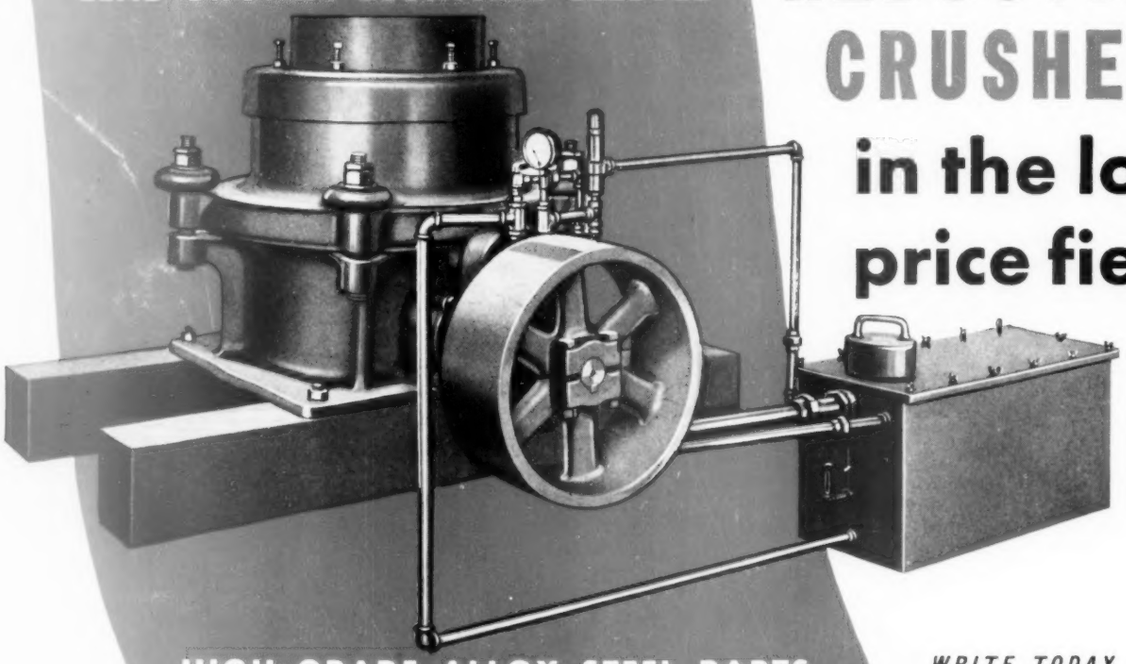

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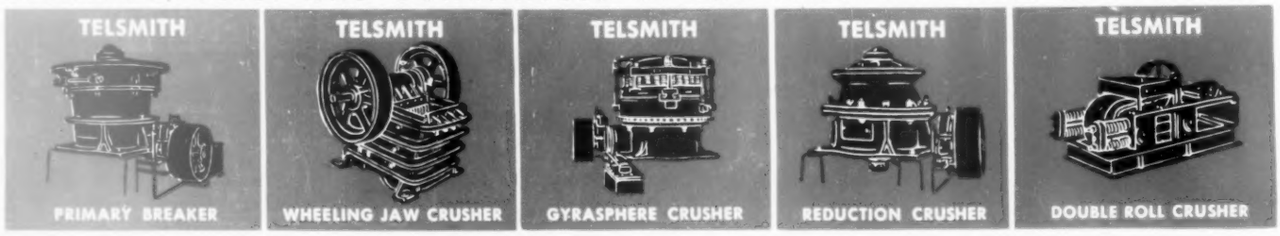
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